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COTTON WILT STUDIES

III. THE BEHAVIOR OF CERTAIN COTTON VARIETIES GROWN ON SOIL ARTIFICIALLY INFESTED WITH THE COTTON WILT ORGANISM

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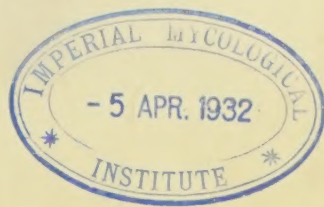


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Although cotton wilt caused by *Fusarium vasinfectum* has been the subject of numerous investigations within the last 30 years looking toward its control by soil treatments and by various methods of crop management, the use of wilt-resistant or wilt-tolerant varieties of cotton still remains the most dependable and efficient solution of the cotton wilt problem both in Arkansas and in the other cotton states. For this reason, the authors have endeavored to compare through extensive field tests on uniformly inoculated land the various wilt-resistant varieties of cotton developed elsewhere in the South, some of the more popular commercial varieties the wilt disease relationship of which was not definitely known, and the strains recently developed by this Station, with the purpose of determining which are more wilt resistant and best suited to Arkansas conditions. Fortunately wilt resistance has been one of the important factors considered in the selection of cotton varieties at the Arkansas Agricultural Experiment Station, and, consequently, few of the cotton strains developed at this station within recent years can be classed as "wilt susceptible" in the sense that this term may be applied to many commercial strains.

Five years work¹ with wilt resistant varieties now justifies the statement that there are available excellent wilt-resistant varieties suitable for use in all parts of Arkansas where cotton wilt is prevalent. Such varieties in addition to being wilt resistant should have good lint yielding qualities, should not have an excessively short staple, should have relatively large bolls, should possess storm "proofness", and should have a high percentage of earliness. With these qualities, a variety should give a high yield of good quality lint even under conditions favorable to the development of cotton wilt, should ordinarily escape severe boll weevil damage even when weevils are present in large numbers late in the season, and should lend itself well to economy in picking.

Certain varieties of cotton highly resistant to cotton wilt were developed by Orton as early as 1900 (3), and since that time many wilt-resistant varieties have appeared. Wilt-resistant varieties of cotton have also been developed by Fahmy (1) in Egypt and by Kottur (2) in India. With changing conditions

¹A preliminary report of the 1926 and 1927 studies of wilt resistant varieties for Arkansas appeared in Bulletin 234 of this station.

in this country, especially since the advent of the boll-weevil, many of the wilt-resistant varieties formerly developed in the United States have been discarded because of late maturity, shortness of lint, small bolls, and low yielding qualities. Moreover, to a very great extent it has been found desirable to develop strains which are suited to the special conditions found in different states. For this reason no attempt is made here to review the literature bearing upon this subject.

In the recent report, heretofore cited, the writers recorded the results of preliminary trials with wilt-resistant varieties at Galloway near Little Rock in Pulaski County, Ark., in 1926 and at the Cotton Branch Experiment Station in Lee County, Ark., in 1927. The 1926 test was grown on Arkansas River bottom land, which had become so heavily infested with the cotton wilt fungus as to make it unprofitable to raise any of the ordinary commercial strains of cotton commonly recommended for Arkansas. Root knot, or nematode disease, was also found to be present in fairly large amounts, which no doubt greatly increased the susceptibility of the crop to cotton wilt. Eighteen different varieties and strains of cotton were employed, some of which, such as Trice and Delfos, were known to be unusually susceptible to cotton wilt infection, while others, such as Alabama Cook, Dixie-Triumph, and Super Seven, were among the varieties classed as "highly resistant". By the end of the first week in August over 87 per cent of the plants in the Trice plot were either dead or severely affected with cotton wilt, and about half of the plants in such varieties as Acala and Delfos were likewise affected. On the other hand, Dixie-Triumph and Cook showed less than 4 per cent cotton wilt at that time and Super Seven showed about 6 per cent. In view of the fact that root knot was a complicating factor at Galloway, the results were taken to be merely suggestive and no attempt was made to secure data concerning yields, length of staple, or other qualities of the various varieties employed. The results were, however, outstanding with respect to differences in wilt resistance, and it was decided to transfer the studies to land free of root knot infestation in order that a better measure of uncomplicated wilt resistance might be obtained.

The 1927 and later tests were conducted at the Cotton Branch Experiment Station in Lee County on land that was artificially inoculated with *Fusarium vasinfectum* by means of pure cultures on wheat bran. By this method, a more uniform infestation was established than could be expected under ordinary field conditions.

Full data concerning the varieties employed, the incidence and development of cotton wilt in the various varieties, the yields of seed cotton and lint, the percentage of lint, length of staple, number of bolls to the pound, lint index, and certain

other data are presented in tabular form in Bulletin No. 234 of this Station. As in the 1926 work, marked differences in wilt resistance were evident, the incidence of cotton wilt varying from less than one per cent in several of the more resistant varieties to over 45 per cent in certain of the plots of Trice 304 used as checks.

METHOD AND SCOPE OF STUDY

The field plan for the 1928, 1929, and 1930 tests varied in minor details only from that of 1927, although the data taken in the last 3-year period were somewhat more inclusive than in the former part of the wilt work. In the latter period the experiments were laid out and planted with a single row to the variety. The series in each of the 3 years were repeated twice, that is, the annual tests were planted in three places in the field. In each series, a check row was placed every fifth row, and this check, or standard, was planted to Trice 304, a strain of the Trice variety which is very susceptible to wilt.

The inoculum was sown in the bed before planting by means of a fertilizer distributor so adjusted that the infectious material was slightly below where the seed was to be planted. The inoculum was uniformly applied to each row in the three series annually. The crop received normal cultural attention and the plants were thinned at the usual period of the season.

In early or midsummer when the more susceptible varieties began to show signs of wilting in some of the plants, the total plants in each row of the whole test were counted. The plants that showed symptoms of the disease were also counted. At approximately 2-week intervals thereafter until maturity began the plants infected with wilt were enumerated. Data giving the total number of plants to the row and the seasonal occurrence of diseased plants expressed as a percentage of the row stand for each variety grown in the 3-year period appear in the appendix. The 1928 results are presented in Table 1, the 1929 results in Table 2, and the 1930 results in Table 3. The data in each table are averages of the three series. After the three series were averaged, the percentages of plants wilted were computed.

The original stand counts computed on the acre basis are given and the total percentages of wilt are repeated in Tables 4, 5 and 6 of the appendix. Along with these data in the appendix for each variety for the 3 respective years the percentage of earliness, the total yield of seed cotton, the lint percentage, the lint yield, the lint gain or loss over the check, the staple length, the bolls required to produce a pound of seed cotton, the fraction of a pound of lint from 100 bolls, the weight of 100 seeds in grams, the lint index, and the seeds per lock are presented. The 1928 results occur in appendix Table 4, the 1929 results in Table 5, and

the 1930 results in Table 6. In each of the six appendix tables, the varietal data are listed in the order in which the varieties were arranged in the respective planting plans.

In 1928 there were 24 varieties and seven check rows in each of the three series. In 1929 and 1930 there were 20 varieties and six check rows in each series. The field plan in 1927 was somewhat different from that used in subsequent years. In 1927 three rows were planted to each variety and each check, and two series only were used. The check, however, occurred every fifth plot as it has with the row tests. Trice 304 was used to plant the check plots in 1927 also. More varieties were included in 1927 than have been employed in later years. The 1927 field test embraced 28 varieties and 8 checks.

As the work progressed some varieties were omitted and others included. These shifts came about by reason of the fact that certain varieties were either very susceptible to wilt or had some of the other undesirable qualities, such as very short staple, too great a degree of lateness, lack of storm "proofness", small bolls, and poor yields.

In Table 1, which is a summary of all the data of the appendix, the varieties for the number of years in which they were grown are grouped and averaged. The varieties in this table are ranked according to the decreasing order of lint yield. Varieties that were tested for 4 years are grouped and ranked in respect to each other and those that were grown for 3 and 2 years were ranked according to their respective groups. The varieties that were grown one year only were grouped and ranked for the year in which they occurred.

The 1927 results are included in the data of Table 1. The three row plots of the 1927 test were averaged for one row, so as to be comparable with the data of the 3 subsequent years.

Basis for Ranking. The varieties were ranked for yield on a percentage, or index basis. The result is a comparative lint yield in per cent. This per cent yield is obtained by expressing the actual yield of a given variety as a percentage of the interpolated yield from the two nearest check rows. The method may be illustrated by taking a portion of the 1928 report, appendix Table 4, and actually going through with the computations.

PORTION OF THE 1928 REPORT

Row No.	Variety	Actual yield	Theoretical yield from check rows	Percentage of the actual yield as related to the theoretical yield of check rows
1 ck	Trice 304 _____	227		
2	Dixie Triumph _____	505	234	216
3	Dixie Triumph 2 _____	482	241	200
4	Dixie 14 _____	446	247	181
5	Cleveland 54 _____	409	254	161
6 ck	Trice 304 _____	261		

To get the theoretical yield or the interpolated yield for each of the four rows between the check rows, the smaller check yield, row 1, is subtracted from the larger check yield, row 6, $261 - 227 = 34$.

Thirty-four, or the difference between the two check rows, is divided by five, since there are five steps or intervals from one check row to the the other, $34 \div 5 = 6.8$.

Six and eight-tenths is the amount of increase or decrease from one intervening row to the other. The assumption is that since check row 1 produces 34 pounds less than check row 6, the natural fertility or cotton producing ability of the land in the position of the former is lower than that of the latter, and that the extra 34 pounds is a measure of this yielding difference. It is further assumed that the degree of fertility or productive ability of the land gradually or at regular intervals increases or decreases from one row to the other between the two check rows and that evaluation of this increase or decrease should be by 6.8 pounds.

The interpolation is computed in this manner:

Check row 1 produced 227 pounds.

$227 + 6.8 =$ Theoretical or interpolated yield of row 2 or 234* pounds.

$233.8 + 6.8 =$ Theoretical or interpolated yield of row 3 or 241 pounds.

$240.6 + 6.8 =$ Theoretical or interpolated yield of row 4 or 247 pounds.

$247.4 + 6.8 =$ Theoretical or interpolated yield of row 5 or 254 pounds.

$254.2 + 6.8 =$ The yield of check row 6, or 261 pounds.

*The fractions are counted to the nearest whole number.

For any given variety its actual yield is multiplied by 100 and this product divided by the corresponding interpolated yield. This process expresses the actual yield as a percentage of the interpolated check rows.

For placing yields on a percentage basis the interpolated yield is thought to be a better common denominator than the average of all check rows or the average of all varieties.

The last column to the right in Table 1 shows the ranking of the varieties according to the percentage yield of the interpolated check rows.

RESULTS OF STUDY

The discussion of results refers first to the seasonal count of the plants having wilt (Appendix Tables 1, 2 and 3) and secondly to the group comparisons of the varieties after they have been arranged according to the years grown and according to the decreasing order of the yield index for each group (Table 1).

Seasonal Counts. In Appendix Table 1 is given the 1928 seasonal count. This table indicates the arrangement of the test in the three series of single row plots, the rows being 254 feet long. The total number of plants of each variety is also shown together with the percentage of wilt at 2-week intervals, beginning with the 84th day after planting and ending with the 127th day after planting, when the crop was practically mature.

As will be seen from Appendix Table 1, the incidence of cotton wilt at the last count varied from over 44 per cent in one of the checks of Trice 304 to less than one per cent in a number of the more resistant varieties employed.

In Appendix Table 2 is given the seasonal count of 1929. This table indicates the arrangement of the test in three series

as in the previous year, together with the incidence of cotton wilt throughout the season. It will be noted that the record extends over a period of more than 2 months with 10-day intervals between counts, as against a record extending over a period of 1½ months with 2-week intervals between counts in 1928.

Appendix Table 2 indicates, as was the case in previous years, that Trice 304 was decidedly more susceptible to cotton wilt infection than was any other variety employed. The three strains of Delfos employed were next in susceptibility, with D. & P. L. 4-8 and Arkansas Acala 37 next in order. The incidence of wilt in all varieties was somewhat greater than in 1928, indicating perhaps somewhat more favorable environmental conditions for cotton wilt development.

In Appendix Table 3 is given the seasonal count for 1930. The season of 1930 was unusual, because of the great deficiency of rainfall which greatly reduced yields in all of the wilt-resistant variety plots at the Cotton Branch Experiment Station. Early season conditions were apparently very favorable for the development of cotton wilt, and more wilted plants were found in the resistant variety plots than is usually the case. However, as the effects of dry weather became apparent in the checked growth of the cotton plants, the development of cotton wilt was also greatly checked with the result that the incidence of wilt on September 5, when the last count was made, was much less than in any previous year since the work was begun in 1926. This checking of cotton wilt during dry seasons has been commonly reported by growers and has been noted in the literature. It has also been noted that after rains following periods of dry weather, cotton wilt is likely to appear in a severe form. This was the case in practically all parts of Arkansas during the season of 1930, and was a very prominent feature of the 1930 wilt work. In view of this fact, further counts after September 5 would have shown a much greater incidence of cotton wilt. However, at that time many of the plants were prematurely matured and dead, and a large percentage of the living plants were badly injured by drought. It was therefore, felt that an accurate count could not be secured and for this reason none was made.²

Appendix Table 3 indicates the arrangement of the varieties and plots in the wilt-resistant variety work for 1930, together

²In many cases it is possible to definitely recognize a plant affected with cotton wilt by its general appearance, and this diagnosis is then easily confirmed by breaking off a leaf and observing the darkening of the veins in the base of the petiole. When any doubt is entertained concerning the presence of the disease, a shallow cut in the main stem near the base, generally discloses the prominent darkening of the wood. Hundreds of isolations from the darkened wood of living plants have never failed to reveal the presence of either *Fusarium vasinfectum* or in very limited number of cases, from the extreme eastern part of the state, of *Verticillium albo-atrum*. Many other fungi are secured from the darkened wood of dead plants and the darkening of the wood of plants which are dead or nearly dead from drought, cotton rust or similar causes cannot be accepted as a sign that the cotton wilt organism is present. For this reason late season counts of cotton wilt are likely to be unreliable.

with the incidence of cotton wilt at brief intervals from early in July to September.

Although none of the varieties in the 1930 wilt studies showed an extremely high incidence of cotton wilt infection, the comparative relationships of the different varieties were somewhat similar to those of previous years. Varieties such as Trice and Delfos still showed a much greater susceptibility to cotton wilt than did other varieties, while Dixie-Triumph, certain selections of Express and Rowden, and Wilt Cleveland 28-5 showed the lowest wilt infection. Yields, percentage of earliness, and no doubt many other qualities of the various varieties, were profoundly influenced by the record breaking drought of 1930, and their performance should not be taken as typical for these varieties in ordinary years.

Stand. The stand, computed on the acre basis, appears under the heading "Number of Plants" in Table 1. In the groups where the varieties have grown two or more years, the stand among varietal averages did not deviate very materially. On the other hand, the stand among given varieties in different years varied considerably. These wide differences in rate of stand were caused by the degree of germination and the manner in which the plots or rows were thinned. There are certain degrees of difference among varieties in germination. Some give a better stand than others, because the seedlings have more vitality or possibly are more resistant to the soreshin fungus. Extremely dry weather, extremely wet weather, or cool weather has a selective effect on the stand of varieties. The personal factor also played a large part in affecting the stand of these experiments. Where a large crew of "choppers" work, the stand is left in a variable condition. Some of the individuals leave much more cotton per linear measurement than others. On the whole the difference in stand was greater from year to year than between varieties in any one year.

It should be noted in section "A" of Table 1 that the average stand for the 4-year period for the varieties and for the check rows did not vary a great deal. On the other hand, there are considerable deviations in stand from year to year among the varieties of the "A" group and among the check rows. Wide variations for the check rows are shown in Appendix Tables 4, 5 and 6, and in sections "G," "H," "I," and "J." Stand irregularities may have affected the yield of the varieties in the "A" group somewhat, but in any one year they were fairly regular throughout the test. However, the stand was poorer in 1930 than in any of the previous years.

In section "B" during the same year, the stand of the two varieties corresponded probably close enough for reliable

1927	Arkansas Row- then to	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	29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ARKANSAS AGRICULTURAL EXPERIMENT STATION

TABLE 1 (Continued). SUMMARY OF VARIETAL DATA GROUPED BY YEARS TESTED AND ARRANGED IN THE DECREASING ORDER OF THE LINT YIELD INDEX

Year	Varieties	Plants withed	Plants without	Early- ness	Total yield seed cotton	Lint	Lint yield	Lint loss check	Staple length	Bolls to the pound	Lint from 100 bolls	Weight of 100 seed	Lint index	Seed per lock	Com- para- tive lint yield
		Num- ber	Per cent	Per cent	P'nds	Per cent	P'nds	P'nds	32nds	Num- ber	P'nds	Grams		Num- ber	Per cent
1927	D & P L 4	16,824	4.0	---	931	35.7	333	64	33	69.3	.50	13.15	7.67	7.58	124
1928		3,000	7.6	53.1	827	38.2	354	106	34	76.8	.48	13.98	7.18	8.58	143
AV.		12,812	5.8	53.1	929	37.0	344	85	34	73.1	.49	12.07	7.43	8.06	134
1927	Express 116	14,896	16.0	---	1,079	32.8	354	66	36	70.6	.46	14.60	7.41	7.45	123
1928		46,225	16.5	66.6	813	34.8	283	25	36	80.4	.43	12.35	6.90	8.66	114
AV.		10,711	16.3	66.6	946	33.8	319	51	36	75.5	.45	13.48	7.16	8.06	119
1927	Williamson 16	19,010	1.2	---	408	28.4	116	162	40	78.1	.36	13.14	5.54	7.52	42
1928		6,045	0.5	33.2	784	29.9	234	8	37	77.9	.38	13.16	5.79	7.91	104
AV.		12,543	0.9	33.2	596	29.2	175	77	39	78.0	.37	13.15	5.67	7.72	73
Average of all check rows—1927 and 1928		13,949	35.4	82.1	689	35.1	242	---	31	88.4	.39	11.00	6.19	7.58	---
E. Tested through 1928 and 1929.															
1928	Express 121	10,695	4.5	63.2	1,497	36.7	549	301	35	70.2	.51	12.19	7.36	8.74	221
1929		9,465	5.9	42.1	937	32.6	326	125	36	78.9	.44	10.34	5.63	8.73	162
AV.		10,080	5.2	52.7	1,217	35.8	438	213	36	74.6	.48	11.27	6.50	8.74	192
1928	Arkansas Avala- 31 (A & 14)	10,125	12.8	62.5	880	35.9	316	83	34	73.9	.48	12.12	7.04	8.59	136
1929		8,970	15.2	40.1	808	34.9	299	81	34	79.4	.42	10.48	5.95	8.21	137
AV.		9,548	14.0	53.8	869	35.4	308	82	34	76.7	.45	11.30	6.50	8.40	137
1928	Delfos 2	10,455	27.2	74.4	827	34.5	285	54	35	92.7	.34	8.97	5.16	8.52	123
1929		8,535	28.1	47.8	769	33.4	257	41	35	94.1	.35	8.98	4.66	8.30	114
AV.		9,495	27.7	61.1	798	34.0	271	43	35	93.4	.35	8.98	4.91	8.41	119
1928	Delfos 6102	9,615	36.0	77.9	765	33.9	259	31	36	88.2	.38	10.28	5.50	8.44	113
1929		7,740	33.7	57.4	619	33.5	207	12	36	100.7	.33	8.75	4.54	8.36	95
AV.		8,678	34.9	67.7	692	33.7	233	10	36	94.5	.36	9.52	5.02	8.40	104
Average of all check rows—1928 and 1929		10,762	40.3	76.4	622	36.1	225	---	31	98.0	.36	9.34	5.49	7.76	---

COTTON WILT STUDIES

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F. Tested through 1929 and 1930.

Year	Location	Seeds	Plants	Wilted	Health	Total yield seed cotton	Lint	Lint yield	Lint loss over check	Staple length	Bolls to the pound	Lint from 100 bolls	Weight of 100 seed	Lint index	Seed per lock	Comparative lint yield
1929	Arkansas Row	9,000	4.3	26.9	901	26.3	337	132	31	68.7	.52	12.41	7.13	8.28	168	
1930	Arkansas Row	11,777	4.3	25.1	282	34.9	196	19	29	70.9	.48	12.28	6.60	8.33	118	
AV.		10,388	4.3	26.0	592	30.6	267	76	30	69.8	.50	12.35	6.87	8.31	143	
1929	Wilson, Va.	11,000	4.4	26.0	507	34.5	312	94	29	90.7	.37	9.56	5.19	7.85	143	
1930	Wilson, Va.	12,012	4.5	23.6	365	33.3	102	5	27	95.2	.33	10.48	5.54	7.82	105	
AV.		11,512	7.2	29.8	605	33.9	207	50	28	93.0	.35	10.02	5.37	7.84	124	
Average of all checks 1929-1929 and 1930																
		13,981	29.9	83.0	444	34.8	157	-----	30	106.0	.33	9.03	4.93	7.72	-----	

G. Tested in 1927 only.

1	Super Seven 1 (Cook)	14,528	1.4	-----	1,135	32.8	372	172	35	73.5	.41	12.44	6.09	7.69	186
2	Cook Improved (Cook)	13,856	2.5	-----	793	35.1	278	65	28	71.3	.50	13.39	7.43	7.37	131
3	Council Toole (De Soto)	15,184	0.1	-----	821	33.2	273	63	29	90.4	.36	11.23	5.93	6.84	130
4	Lewis 3 (De Soto)	7,360	0.4	-----	882	32.2	284	52	29	81.3	.38	11.18	5.62	7.57	122
5	Ston. Pcty (Pcty)	19,648	0.4	-----	735	32.5	239	18	30	80.2	.41	12.04	5.82	7.90	108
6	Wanna Cleve- land 4 (Cox- ington)	12,480	1.4	-----	749	33.8	253	16	28	66.9	.50	11.88	6.18	7.55	107
7	Wanna- maker (Toole)	23,184	0.1	-----	710	33.4	237	1	29	73.7	.46	11.94	6.14	7.55	100
8	Toole (Wilkin- son)	19,440	1.1	-----	729	34.2	250	11	29	72.3	.47	12.13	6.40	7.41	96
9	Cook 1010-315 (Ston. Pct. S. Co.)	19,680	0.8	-----	587	34.9	205	10	30	61.2	.56	14.09	7.80	7.53	95

TABLE 1 (Continued). SUMMARY OF VARIETAL DATA GROUPED BY YEARS TESTED AND ARRANGED IN THE DECREASING ORDER OF THE LINT YIELD INDEX

Rank	Variety	Plants wilted	Earli- ness	Total yield seed cotton	Lint	Lint yield	Lint gain or loss over check	Staple length	Bolls to the pound	Lint from 100 bolls	Weight of 100 seed	Lint index	Seed per lock	Com- para- tive lint yield
		Num- ber	Per cent	P'nds	Per cent	P'nds	P'nds	3nds ¹	Num- ber	P'nds	Grams		Num- ber	Per cent
10	Cook 307-6 (Ala)	21,072	0.6	583	35.2	265	—	20	73.9	.46	13.16	7.64	7.99	91
11	Woods (Miss)	12,688	2.9	519	32.5	189	—	21	73.8	.46	10.52	5.0	8.41	88
12	Cook (Rhyn)	14,944	0.3	506	34.8	176	—	42	68.6	.52	13.27	7.29	7.88	81
13	Tomle (Covlin- ton)	16,176	2.1	524	33.1	173	—	75	79.4	.42	12.77	6.50	7.91	70
14	Trade (Miss)	13,410	1.1	482	32.5	157	—	71	83.7	.39	13.36	5.60	7.84	67
15	Trade 335	33,216	1.9	390	34.0	112	—	173	83.0	.41	13.13	6.91	7.92	39
Average of all check rows—1927		14,956	33.7	727	33.8	246	—	—	82.3	.41	12.21	6.49	7.27	—
H. Tested in 1928 only.														
1	Triumph 44-13	10,650	20.0	72.2	37.2	391	160	31	73.3	.49	10.78	6.72	8.64	169
2	Delos 1341	11,058	36.4	72.2	37.2	370	31	35	93.6	.39	9.94	5.75	8.25	117
3	Price 322	8,505	21.1	87.3	36.3	278	36	30	99.5	.36	10.62	6.29	8.16	115
4	Acala 31	6,345	14.4	62.2	36.8	241	2	32	77.6	.47	11.68	6.99	8.50	101
5	Acala 33	8,145	16.9	74.1	36.4	233	—	33	79.8	.44	12.00	6.87	8.63	100
Average of all check rows—1928		12,941	37.0	650	36.4	237	—	—	94.5	.37	9.78	5.88	7.89	—
I. Tested in 1929 only.														
1	Super Seven (Sgrig)	9,840	1.1	39.4	34.3	323	102	35	92.4	.36	9.27	4.96	7.85	146
2	Arkansas Row- den 1041	9,570	14.1	43.5	35.8	294	88	33	72.6	.48	11.01	6.28	8.26	143
3	Arkansas Row- den 1017	9,450	7.9	68.8	35.4	266	66	33	90.5	.39	9.51	5.31	8.03	133
4	Arkansas Row- den 1011	6,750	24.9	45.8	34.4	213	3	36	80.9	.42	11.17	6.33	8.41	101
Average of all check rows—1929		8,583	43.5	70.7	35.8	213	—	—	101.4	.35	8.90	5.10	7.63	—

J. Tested in 1930 only.															
1	Half and Half (Summerour)	9,390	19.3	94.4	268	44.8	120	32	24	89.3	.47	8.63	7.35	8.44	136
2	Misdal 2	17,625	10.7	95.7	347	32.9	114	21	33	119.0	.27	8.77	4.37	8.05	123
3	D & P L 10	15,900	6.9	95.5	338	36.0	122	21	31	100.0	.36	9.70	5.27	7.69	121
4	Express 317 (La. Sta.)	13,560	2.8	90.9	317	33.6	107	14	33	103.1	.32	10.83	5.61	7.69	115
5	Arkansas Row- den 3053	11,445	4.9	91.7	345	36.2	125	14	28	73.0	.47	12.34	7.21	8.08	113
6	Wilt Cleveland (Coker)	8,730	2.0	95.1	339	34.5	117	9	32	97.1	.35	10.64	5.58	8.08	108
7	Ark. A 11.34	11,865	1.2	94.1	310	34.6	107	9	30	87.0	.39	11.30	6.05	7.90	98
8	Delos 668 (La. Sta.)	9,570	7.6	93.2	265	30.2	80	— 12	33	100.0	.29	9.68	4.25	7.77	87
9	Arkansas Row- den 3054	10,500	3.0	94.0	253	35.4	90	— 22	28	73.5	.47	12.83	7.02	8.11	80
10	Arkansas Row- den 4053	7,680	5.2	88.6	252	33.7	85	— 27	29	68.5	.48	13.18	6.81	7.89	76
Average of all check rows—1930													4.76	7.80	-----

yield comparisons, except in 1929 when the stand of Dixie 14 was quite low.

In section "C" Arkansas 17 had a low stand in 1928 and Arkansas Rowden 2119 had a low stand in 1929. However, the average stand of the two varieties over the 3-year period was about the same. In the cases where the stand was low, the yield might have been slightly decreased.

Among the five varieties in section "D" the acre stand was much higher in 1927 than in 1928. Although the stand among these varieties in 1927 varied considerably, it seems sufficient for ample production. However, with each of the five varieties in 1928, the stand appeared to be too low for best yields unless it was with Dixie-Triumph (Marett). However, the yields were not always lower in 1928 than in 1927.

With the four varieties of section "E," the stand was higher in 1928 than in 1929. The yield was also larger in 1928 than in 1929, except with the yield index of Arkansas Acala 37 where the 2 years were similar. The difference in yield, however, should not be attributed to the stand alone, as seasonal effect may have been a factor also. The stand in 1929 was probably slightly low for best production. Low stand, no doubt, was a factor with Delfos 6102 in 1929, as this variety was below the check variety in lint yield.

With the two varieties in section "F," the average stand of 1930 was somewhat higher than in 1929. However, the yield was around three times higher in both varieties in 1929 than in 1930, when the drought reduced the yield in the latter year. The stand difference between the years or between the varieties probably did not effect much variation in yields.

In section "G," where a group of varieties were grown in 1927 only, considerable variation in stand was exhibited. The stand of Lewis 63 (De Soto) was somewhat low and that of Trice 323 exceptionally high. None of the stand rates particularly correlated with yields in this group. Lewis 63 (De Soto) ranked fourth from the highest in yield, and Trice 323 ranked the lowest in yield. The extreme susceptibility of this variety to boll rot was another factor which caused marked reduction in yield.³

In section "H" among the five varieties grown in 1928 only, there were no extreme variations in stand. The stand of Arkansas Acala 31 was somewhat low for best yields. However, no evident correlation between stand and yield appears in this group.

In section "I" the stand of three of the varieties was almost identical, while the fourth one was somewhat lower in stand and also in yield than the first three.

³The extreme way in which Trice 323 was attacked by boll rot, apparently in most cases a combination of angular leaf spot and anthracnose, emphasizes the fact that there is a very great degree of difference in the resistance or susceptibility to boll rotting among varieties and strains of cotton.

In section "J" of Table 1 there is shown considerable variation in stand among the varieties grown in 1930 only. The low stands may have affected the yields of some of the varieties, but the lower yields in all cases did not coincide with the thinnest stands.

The stand or number of plants to the acre has been discussed for the purpose of calling attention to the considerable variations in this respect and to point out the fact that, in spite of the large divergences in the degree at which the plant numbers existed, the yields seemed not to be materially affected except in a few cases. However, whenever low stands and low yields coincided, it cannot be definitely concluded that low production was solely attributable to the thinner rate of stand. A certain acre count of plants does not reveal the nature of the stand. The stand may have been thin with the plants uniformly distributed, or it may have been thick in certain portions of the row and totally absent of plants in other sectors. Long skips materially reduce yields, while with a uniform thin stand production may not be altered.

Percentage of Plants Wilted. The percentages of wilted plants are discussed according to the grouping of varieties in Table 1. The varieties in the experiments can be studied better by comparison of those which have grown under similar conditions. The amount of wilt occurring in cotton is affected by the season; therefore more reliable conclusions relative to the resistance of varieties to the disease exist where the test is made the same year or through the same period of years. The average wilt percentage of all check rows in 1927 was 33.7, in 1928 37.0, in 1929 43.5, and in 1930 16.2. The percentage of wilt in the varieties in the test likewise varied from year to year. A study of Table 1 will indicate these variations. The Appendix tables bring out these deviations in the percentage of wilt and also show variations from check row to check row during the same year. To best arrive at what seems to be the more reliable conclusions, averages of varieties and averages of check rows grown over the same period of time were made.

In section "A" the average percentage of wilted plants in the 4-year period was for Dixie-Triumph (Watson), 2.1; for Miller, 3.0; for Super Seven, 2.1; for D. & P. L. 6, 4.7; for Cleveland 54, 6.4; for Arkansas Rowden 40, 3.5; and for the average of all check rows for 4 years, (Trice 304), 32.6. In this group of varieties, Dixie-Triumph (Watson) and Super Seven had the lowest wilt percentage, and Cleveland 54 the highest except the check row average. The high wilt percentage in the check rows, no doubt, materially reduced the yield, but with the six other varieties the attack of the disease was not sufficient to bring about any effects on production. The lack of correla-

tion between the amount of wilt and the yield among the six varieties of the "A" group shows that where cotton wilt attacks are as light as with these varieties no discernable effect on yield occurs. This conclusion is also borne out by the data of the individual years of these varieties. Under ordinary conditions where wilt resistant varieties are to be recommended the percentage of wilted plants occurring in Dixie-Triumph (Watson), Miller, Super Seven, D. & P. L. 6, Cleveland 54, and in Arkansas Rowden 40 is not sufficiently high to warrant the condemnation of these varieties.



Figure 1.—Test of wilt resistant cotton varieties at the Cotton Branch Experiment Station in Lee county, 1927. Three rows at left Super Seven Strain No. 1 and three rows at right check of Trice 304. The latter variety showed about 42 per cent of cotton wilt compared to 1.1 per cent in the variety Super Seven.

In section "B" it is shown that of all the varieties carried in the experiment as long as 3 years, Dixie 14 was the most free of wilt. The average of the 3-year period was 0.2 per cent; in 1927 the infection was 0.2; in 1928, 0.3; and in 1929, 0.0. D. & P. L. 8 had a larger percentage of infection. In 1927 D. & P. L. 8 was infected to the extent of 7.9 per cent; in 1928, 17.1 per cent; and in 1929 17.6 per cent of the plants were attacked. The average percentage of wilt in D. & P. L. 8 for the 3-year period was 14.2. For the same period the average percentage of wilt for the check rows was 38.1. The presence of wilt in the D. & P. L. strain, no doubt, reduced the yield of this strain. In varietal tests conducted on land not subject to wilt, D. & P. L. 8 is one of the highest yielders. The yield index of D. & P. L. 8 was 7 per cent lower than that of Dixie 14, which was practically free of wilt. From the standpoint of freedom from wilt alone Dixie 14 is the best variety for land heavily infested with

the disease, while D. & P. L. 8 should hardly be recommended where wilt attacks are at all severe.

In section "C" for the 3-year period Arkansas 17 had 4 per cent of the plants wilted, and Arkansas Rowden 2119 had 6.3 per cent of the plants attacked by the disease. The average of all check rows (Trice 304) for this period showed 32.2 per cent wilt, which, no doubt, was the agency that reduced the yield of Trice 304. Where no wilt appears this strain of Trice produces a high yield. In two varieties, Arkansas 17 and Arkansas Rowden 2119, the amount of cotton wilt varied somewhat in the different years. In 1929 the wilt percentage of Arkansas 17 was 9.1, and that of Arkansas Rowden 2119 was 9.2. In 1928 the wilt percentage of Arkansas 17 was 2.6, and the wilt percentage of Arkansas Rowden 2119 was 4.8. In 1930 the wilt percentage of Arkansas 17 was 0.3, and that of Arkansas Rowden 2119 was 5.0. Arkansas 17 in most cases, where soil is infested with the wilt organism, would be sufficiently resistant to the disease, while Arkansas Rowden 2119 should be classed as wilt tolerant. Under highly favorable conditions for the disease, the latter variety may wilt enough to reduce yields somewhat.

In section "D" Dixie-Triumph (Marett), Lightning Express, and Williamson 10 each shows that a very low percentage of plants wilted, while the other two varieties had somewhat higher percentages. The 2-year averages of plants wilted are as follows: Dixie-Triumph (Marett), 0.5; Lightning Express, 0.8; Williamson 10, 0.9; D. & P. L. 4, 5.8; and Express 116, 16.3. Lightning Express had no wilted plants in 1928. The average wilting percentage for all check rows (Trice 304) tested in connection with the varieties in this group was 35.4. Dixie-Triumph (Marett), Lightning Express, and Williamson 10 are shown to be highly resistant to wilt. D. & P. L. 4 may be classified as wilt tolerant, while Express 116 was somewhat too susceptible to the disease to be a safe variety on land heavily infested with the wilt organism.

In section "E" it is shown that the four varieties arranged in this group are susceptible to wilt, especially is this the case with the Delfos strains. In Express 121, Arkansas Acala 37, and Delfos 2 the percentage of infection was somewhat more in 1929 than in 1928. In Delfos 6102 the reverse was true. In the 2-year average the varieties ranked in susceptibility as follows: Delfos 6102, 34.9 per cent; Delfos 2, 27.7 per cent; Arkansas Acala 37, 14 per cent; and Express 121, 5.2 per cent. The amount of wilt in these four varieties seemed to be a factor in the reduction of yields. The Delfos strains on land free of wilt produce high lint yields. In going from the highest lint producing variety to the lowest lint producing variety of this group of four varieties, the percentage of wilted plants increases. Express 121 has a yield index of 192 and a wilt percentage of 5.2. Arkansas Acala 37

yield index 137, wilt percentage 14.0; Delfos 2 yield index 119, wilt percentage 27.7; and Delfos 6102 yield index 104, wilt percentage 34.9. The average of all check rows grown during this 2-year period had a wilt percentage of 40.3. The yield index of the check rows is considered as 100. Of the two Delfos strains, Delfos 2 is the less susceptible to the disease. The percentage of wilt infection in Express 121 as compared with the other three varieties of this group is low, but perhaps not sufficiently low for safety where the soil is badly infested with the wilt organism. Express 121 may be classified as wilt tolerant and can be recommended where a moderate amount of wilt exists in the soil. Arkansas Acala 37 may stand up fairly well in yields where there is a small amount of wilt, but Delfos 2 and Delfos 6102 should not be recommended where any wilt prevails.

In section "F" the percentage of plants wilted in Arkansas Rowden 2088 was the same, 4.3 in both years, while the percentage of plants wilted in Wilson Type Big Boll was 9.6 in 1929 and 4.8 in 1930. For the 2-year period the latter variety averaged 7.2 per cent. The average wilt percentage of all 1929 and 1930 check rows was 29.9. The two varieties, Arkansas Rowden 2088 and Wilson Type Big Boll, may be classed as wilt tolerant, although the disease may be a considerable factor with them on highly infested soils.

In section "G" none of the 15 varieties had a sufficient number of plants wilted to warrant their elimination because of the disease alone. These varieties were discarded on the basis of other economic factors.

In section "H" the five varieties each showed a considerable percentage of infected plants. None of these varieties should be recommended for wilt infested soils. The average of the check rows (Trice 304) in 1928 showed a wilt percentage of 37.0; Delfos 1341, 36.4; Trice 322, 21.1; Triumph 44, 20.0; Acala 33, 16.9; and Acala 31, 14.4.

In section "I" the varieties were somewhat variable in the amount of wilt shown. The average of all check rows in 1929 had 43.5 per cent wilt; Misdell 1, 24.9 per cent; Arkansas Rowden 1034, 14.1 per cent; Arkansas Rowden 1077 had 7.9 per cent; and Super Seven (Isgrig), 1.1 per cent. Super Seven should be classified as wilt resistant, Arkansas Rowden 1077 as wilt tolerant, the other two varieties and the check rows as susceptible to wilt. The check rows of course in all cases were highly susceptible. Misdell 1 also is highly susceptible to the disease.

In section "J" where the varieties that have been grown in 1930 alone are grouped, the amount of wilt present was not high. Since 1930 was so unusually dry, results based upon counts made during this season may not be indicative of what would happen in most years. However, varieties like Half

and Half and Misdell, which are expected to be wilt susceptible, showed higher counts of wilted plants than other varieties in this group which are thought to be more resistant.

Earliness of the Varieties. Since the advent of the boll weevil, earliness, or rapidity in fruiting of a variety, has been considered an important factor in cotton. The more bolls a variety develops before weevil damage becomes heavy the less the injury to the total crop. Earlier maturing varieties are likely to be less reduced in yield by the leaf worm than later maturing varieties. Early to medium-maturing varieties can be harvested before unfavorable weather of the late fall is likely to set in. Since the earlier varieties are the more desirable from several viewpoints, it is important to know whether or not wilt resistance is correlated with earliness. During the 4-year period in which these experiments have been conducted at the Cotton Branch Experiment Station, boll weevil and leaf worm attacks were negligible; consequently, there was no evident correlation between yield and earliness except in the case of some of the very late varieties which were reduced in their production by the approaching fall weather. Except with some of these very late varieties, there seemed to be no factors vitiating the study of the relationship of the percentage of earliness and the percentage of wilt in the data drawn from these experiments. However, wilt in itself tends to increase earliness by causing the bolls on the plants attacked to open prematurely. Premature popping of the bolls permits an apparent association of wilt and earliness which is not as real as it may seem. The varieties are discussed from the standpoint of earliness by groups as they are arranged in Table 1. The percentage of earliness was not determined in 1927, as one picking only was made.

In section "A" of Table 1 the percentage of earliness and the percentage of plants wilted did not vary greatly among the six varieties. Earliness did not seem to correlate with yield. Also there was no apparent relationship between earliness and the number of plants affected with wilt.

In section "B" D. & P. L. 8 was shown to be earlier than Dixie 14 as compared for 1928 and 1929, but the extra earliness in the former variety did not enhance its yields over the latter, which result is to be expected when insect attacks occur. The amount of wilt was greater in the earlier of the two varieties, but this does not necessarily indicate that earlier varieties are more susceptible to wilt. D. & P. L. 8 may have been more susceptible to the disease because of some quality other than earliness. Even the fact that Trice 304, used in the check rows, is extremely early and also highly susceptible to wilt does not necessarily prove that earliness and susceptibility to wilt are associated.



Figure 2. Test of wilt resistant varieties of cotton at the Cotton Branch Experiment Station in Lee county. Trice 304 (susceptible) in center, wilt resistant varieties at sides.

In section "C" the percentage earliness of each of the two varieties, Arkansas 17 and Arkansas Rowden 2119, varied somewhat from year to year. The time that the first picking is made each year affects the expression of earliness. All varieties in the test appeared earlier in 1930 than in previous years. The extremely dry season of 1930 hastened maturity in the earlier fruit and prevented development in the latter part of the season. The average of the two varieties and the check row average, however, are comparable. For the 3-year period Arkansas 17 showed an average earliness percentage of 58.3, Arkansas Rowden 2119 showed an average earliness percentage of 67.2, and the average of all check rows for the 3 years showed an earliness percentage of 82.7. The percentage of wilted plants in the average of Arkansas 17 was 4.0; that of Arkansas Rowden 2119, 6.3; and that of the averaged checks for this group, 32.2. The yield index decreased with the increase in earliness, and the wilt percentage increased with earliness among the two varieties and the check row average. However, the apparent relationship of those three characteristics in this case does not prove that either yields or the degree of wilt infection are associated with earliness. Neither the difference between the respective wilt percentages of Arkansas 17 and Arkansas Rowden 2119, nor the difference between the percentage of earliness in the two varieties, are dispersed sufficiently to indicate correlation between the degree of wilt infection and earliness.

In section "D" the comparison for earliness of the five varieties is made for the year 1928 alone. As previously stated, one picking only was made in 1927. The relative earliness of

the five varieties and that of the averaged check rows for this group are as follows: Express 116, 66.6 per cent; Lightning Express, 59.4; D. & P. L. 4, 53.1 per cent; Dixie-Triumph (Marett), 42.7 per cent; Williamson 10, 33.2; and the averaged check rows, 82.1 per cent. The check, which was considerably earlier than any of the other five varieties, had a much higher wilt percentage than these varieties. Express 116 which was the earliest of the five varieties had a larger wilt percentage than any of the other five varieties. Lightning Express, being the next in order for earliness, on the other hand had a very low wilt percentage. D. & P. L. 4 was next in order for earliness, yet it had a higher wilt percentage. The latest maturing variety, Williamson 10, had a low wilt percentage. In this group there is some indication of wilt being more prevalent in earlier varieties except with Lightning Express. The association, where it exists, may be merely coincidental; these earlier varieties may not in reality be more susceptible to wilt.

In section "E" the four varieties are all early. The 2-year average in earliness percentage for Express 121 was 52.7; for Arkansas Acala 37, 53.8; for Delfos 2, 61.1; for Delfos 6102, 67.7; and for the 2-year average of all check rows, 76.4. Though none of these varieties were late, yet it seems that percentage of wilt infection is correlated with earliness. In this group the earlier the variety the more wilt there was present. However, since this relationship is not borne out in many of the group comparisons, no definite conclusion should be drawn without further evidence.

As shown in section "F", earliness of both varieties included was much greater in 1930 than in 1929. This difference was due to the 1930 drought. The 2-year results taken together indicate that Wilson Type Big Boll was slightly earlier than Arkansas Rowden 2088. The percentage of wilt was also somewhat larger with the former variety than with the latter. The difference in earliness between the two varieties, however, is hardly sufficient to warrant the conclusion that because Wilson Type Big Boll is earlier than Arkansas Rowden 2088 it is less resistant to wilt than the latter.

Since only one picking was made in 1927, there are no data on earliness in the "G" section. There is some indication of correlation between earliness and the amount of wilt in the "H" section. Arkansas Acala 31, which is the latest variety of the group, has a lower wilt count than any of the five varieties. Trice 322, which is the earliest of the group, stands second from the highest in the amount of wilt. Delfos 1341, which is the second earliest of the group, has the largest number of plants wilted. Arkansas Acala 33, which is the third earliest, stands fourth from the highest in the number of plants wilted. Triumph 44-13, which is the fourth earliest, stands third from the highest

in wilt percentage. With the four varieties in section "I", there is some indication of correlation between earliness and the amount of wilt, though the relationship is not consistent. Super Seven (Isgrig) is the latest variety of the group and has a somewhat low percentage of plants wilted. On the other hand, Arkansas Rowden 1077 is the earliest, and it has a much lower percentage of plants wilted than Arkansas Rowden 1034 or Misdell 1. Misdell 1 is the second earliest of the group, and Arkansas Rowden 1034 is the third earliest of the group. In section "J" the earliness determinations and the incidence of wilt infection were both so altered by the 1930 drought that conclusions from these data should not be made.

Yields. The yields of the varieties are expressed in four ways: by the weight of seed cotton, by the weight of lint, by the lint gain or loss over the check rows, and by the yield index. The methods by which these measures have been taken have been discussed heretofore. In the present discussion of yields the varieties are considered in groups as they appear in Table 1. The yields expressed in seed cotton, lint, and lint gain or loss over the check rows are reported in pounds to the acre. The yield index is a percentage. In each respective group or section of Table 1, the varieties are arranged according to the decreasing order of the yield index, which seems to be the best measure of yield. However, the weight of seed cotton, the weight of lint, and the lint gain or loss over the check rows are given for study and comparison with the yield index. Since the percentage of lint affects lint yields and the yield calculations based upon lint yield, the lint percentage is considered and discussed in connection with the discussion of yield. The lint percentage is given in Table 1 along with the yield data.

In section "A" of Table 1, the yield of seed cotton, among the six varieties included, decreased with the yield index except with Cleveland 54. According to seed cotton yields, Cleveland 54 should be placed between Miller and Super Seven. The amount of lint decreased with the yield index except in two cases, that of D. & P. L. 6 and Cleveland 54. According to lint yield Cleveland 54 should have followed Miller and D. & P. L. should have followed Cleveland 54. In the column showing the plus yields of lint over the check yields, Cleveland 54 should have been placed between Super Seven and D. & P. L. 6. The reason that these absolute yields do not correspond to the index, in case of the varieties mentioned, is that percentage is affected by the relative sizes of the actual yield and the theoretical yield. It is noted that the yield indexes of D. & P. L. 6 and Cleveland 54 are practically the same, and that the yield index of Super Seven is only 6 per cent higher than that of D. & P. L. 6. In the 4-year average of the six varieties of the "A" section, Dixie-Tri-

umph (Watson) stood highest in yield of seed cotton, in yield of lint, in plus yield over the interpolated check, and yield index. In two of the years the yield was more erratic with Dixie-Triumph (Watson) than with the other five varieties of the "A" group. The yield index of this variety in 1928 was 216 per cent and in 1930, 87 per cent. The yield of 1930 was probably reduced somewhat by insufficient stand. It should also be noted that the yields in all varieties grown in 1930 are unusually low on account of the severe drought of that year. While the variability of yields in Dixie-Triumph (Watson) was more than with the other five varieties, this variety should stand first, but it should not be considered greatly superior in production to the other five. Of the six varieties in the "A" group, Arkansas Rowden 40 stands lowest, but after taking into consideration the performance of this variety as shown in other tests, it should not be severely discriminated against for its standing in this test. From the standpoint of yield it can be concluded that the six wilt resistant varieties of the "A" group are satisfactory for recommendation on the wilt lands of Arkansas. The lint percentage of the six varieties is satisfactory. It is 36.2 for D. & P. L. 6; 35.3 for Cleveland 54; 35.2 for Dixie-Triumph (Watson); 34.7 for Miller and Super Seven, and 34.4 for Arkansas Rowden 40.

In section "B" the total yield of seed cotton, the yield of lint, the gain of lint over the interpolated check rows in the two varieties correspond with the yield index. In the two varieties included the percentage of lint does not vary much during the 3 years except with Dixie 14 in 1927. This variety was considerably lower for lint percentage in 1927 than it was in 1928 and in 1929. Generally the lint percentage of the two varieties is high. During the 3-year period, Dixie 14 averaged 36.6 per cent and D. & P. L. 8, 39.3 per cent. As far as yields are concerned, Dixie 14 and D. & P. L. 8 were satisfactory. The incidence of wilt in the latter variety, no doubt, reduced its yields somewhat. D. & P. L. 8 probably should not be planted on land heavily infested with wilt.

In section "C", the yield of seed cotton, the yield of lint, and the plus yield of lint over the interpolated check of the two varieties, Arkansas 17 and Arkansas Rowden 2119, decrease in the same order as that of the yield index. The yields from year to year with each of the two varieties varied. In 1930 Arkansas Rowden 2119 was even slightly lower in yield than the interpolated check rows, but the 3-year average of this variety ranked in the yield index at 137. From the standpoint of yields Arkansas 17 and Arkansas Rowden 2119 are satisfactory. The former variety is more resistant to wilt than the latter; however, the two varieties are classed as wilt tolerant. For the three-year

period the lint percentage of Arkansas 17 was 34.0, and Arkansas Rowden 2119, 35.1.

In section "D", the lint yield and the difference of this yield from the interpolated check rows among the five varieties decreased in the same order as did the yield index. The yield of seed cotton also corresponds to the decreasing order of the yield index, except with Express 116. The percentage of lint factor caused this irregularity in the decreasing order of the seed cotton. In the 2-year average D. & P. L. 4 produced 929 pounds of seed cotton and 344 pounds of lint, and Express 116 produced 946 pounds of seed cotton and 319 pounds of lint. The larger proportion of lint in the former variety over the latter was because of the lint percentage. The percentage of lint for D. & P. L. 4 was 37.0 and with Express 116, 33.8. From the standpoint of yield Dixie-Triumph (Maret) stood first; Lightning Express, second; D. & P. L. 4, third; Express 116, fourth; and Williamson 10, fifth. The first two varieties and the last one were highly resistant to wilt. D. & P. L. 4 was wilt tolerant, but Express 116 was somewhat susceptible to wilt. The yield of Williamson 10 was very low, which probably was caused by the inherently poor producing qualities of the variety and its extreme lateness. The presence of a considerable percentage of wilt in Express 116, no doubt, had a tendency to cut the yields in this variety.

In section "E", the yield of seed cotton, the yield of lint, and the plus value of lint over the interpolated check rows, after the 2-year average was taken, decreased from variety to variety along with the yield index. The yield both of seed cotton and of lint was larger for each variety in 1928 than in 1929. The percentage of lint was slightly higher with the four varieties in 1928 than in 1929. In the 2-year average the percentage of lint for Express 121 was 35.8; for Arkansas Acala 37, 35.4; for Delfos 2, 34.0; and for Delfos 6102, 33.7. The percentage of lint happened to be in a decreasing order with the yields. Express 121 produced a splendid yield, while the yields of Arkansas Acala 37 and Delfos 2 were fair. The yield of Delfos 6102 was quite poor. The presence of wilt, no doubt, considerably reduced the yields of the two Delfos strains; and caused a moderate decrease in the yield of Arkansas Acala 37.

In section "F", the yield of seed cotton, the percentage of lint, the yield of lint, and the plus yield of lint over the interpolated check rows were associated in a positive way with the yield index in the two varieties. By all these measures of yield Arkansas Rowden 2088 ranked somewhat above Wilson Type Big Boll. The former variety also had the slightly lower incidence of wilt infection.

In section "G", seven of the 15 varieties, according to the yield index rank as well or better than the check variety. The other eight varieties were below the check variety as based upon

the yield index measure. In general the yield of seed cotton, the yield of lint, and the plus or minus lint yields, as compared with the interpolated check yields, were in agreement with the value of the yield index. Slight deviations from a complete correlation of these measures of yield are caused by variations in lint percentage among the varieties and the proportional sizes in yield where the individual interpolations were made. Based on yield alone the first three or four of the varieties were satisfactory, but the others of the group were too low in this respect for further consideration. All the varieties in section "G" were satisfactory from the standpoint of wilt resistance.

In section "H", the five varieties ranked in the same order for yield of seed cotton, yield of lint, lint gain or loss over the interpolated check row as for the yield index, except in the case of one slight irregularity with respect to seed cotton. The percentage of lint for the five varieties differs somewhat, but in all cases is satisfactorily high. Triumph 44-13 is the only variety among the five that produced a sufficient yield to be considered worthwhile. Yield results for the other four were as good or better than that of the check variety, but not sufficiently pronounced to receive much consideration as varieties for soils having wilt since, as previously noted, all five varieties in this group were somewhat susceptible to wilt.

In section "I", the four varieties ranked for the other measures of yield in the same order as they did for yield index. Their percentages of lint varied and were not extremely high, but were satisfactory. As based upon yield, the first three varieties seem to be worthwhile, but the fourth one, Misdell 1, was too low in production. The yield of this variety, no doubt, was considerably reduced by wilt attack.

In 1930 the yield was low and the stand was irregular. Consequently the varieties which were grown in 1930 only should be further tested before definite conclusions are drawn. However, complete data for these varieties are given in section "J" for the sake of completeness.

Staple Length. The staple length of all the varieties has been carefully determined. This has been done in order to find wilt resistant varieties with good staple qualities as well as other desirable characteristics. The discussion of staple length is based upon the groups in Table 1 as for other characteristics.

In section "A" of Table 1 the staples of the six varieties were all of tenderable lengths. Over the 4 year period the average for D. & P. L. 6 was $1\frac{3}{32}$ inches; for Super Seven, $1\frac{1}{16}$; for Miller, $1\frac{1}{32}$; for Arkansas Rowden 40, 1; and for Dixie-Triumph (Watson) and Cleveland 54 each, fifteen-sixteenths. There was from year to year considerable variation in length of staple with five of the six varieties. However, none of the deviations were below seven-eighths of an inch. Variation found during the

4-year period was one-thirty-second of an inch for Dixie-Triumph (Watson); one-eighth for D. & P. L. 6, Cleveland 54, and Miller; three-sixteenths for Arkansas Rowden 40; and seven-thirty-seconds for Super Seven. This variation was no doubt partly because of error in handling, since the staple pulling was not done by the same person each year, but it seems likely that the greater portion of the deviation was a result of seasonal effects. It should be noted that of the five varieties, excepting Dixie-Triumph (Watson), the staple was shorter in 1930 than in the 3 previous years. The staple of Dixie-Triumph (Watson) was shorter in 1930, however, than in the average for the 4 years. It seems probable that the shortened length in 1930 was caused entirely by the severe drought, unless the person who stapled the samples for this year "pulled them down" more than did the persons who determined the lengths in the other 3 years. Of the six varieties, D. & P. L. 6 is considered long staple, Super Seven, Miller and Arkansas Rowden 40 staples of intermediate length, and Dixie-Triumph (Watson) and Cleveland 54 short staples.

In section "B", it is shown that during the 3-year period in which Dixie 14 and D. & P. L. 8 were grown, the staple length of the former varied three-thirty-seconds of an inch and the latter one-sixteenth. This indicates that the longer staples do not always vary most, for the shorter of the two varieties in this group varied more than the longer. During the 3-year period Dixie 14 averaged thirty-one-thirty-seconds of an inch and D. & P. L. 8 averaged $1\frac{1}{32}$ inches in staple length.

In section "C", average staple length for the 3-year period for Arkansas 17 was $1\frac{3}{32}$ inches and for Arkansas Rowden 2119 was thirty-one-thirty-seconds. The seasonal variation in lint length with Arkansas 17 was three-thirty-seconds and with Arkansas Rowden 2119 was one-eighth of an inch. The shorter staple variety of these two varied more. The variety with the longer staple in the "C" group comparisons produced the larger yield, indicating that the shorter staple varieties do not always produce more lint than the longer staple varieties. The percentage of wilt was slightly higher in Arkansas Rowden 2119 than in Arkansas 17, but the difference did not seem to be sufficient to reduce the yield of the former 5 per cent or more.

In section "D", the 2-year average of staple length for Williamson 10 was $1\frac{7}{32}$ inches; for Lightning Express, $1\frac{7}{32}$ inches; for Express 116, $1\frac{1}{8}$ inches; for D. & P. L. 4, $1\frac{1}{16}$ inches; and for Dixie-Triumph (Marett), twenty-nine-thirty-seconds of an inch. In the 2-year period the seasonal variation of staple length for Dixie-Triumph (Marett) was one-sixteenth inch; for Lightning Express, one-sixteenth inch; for D. & P. L. 4, one-thirty-second inch; for Express 116, none; and for Williamson 10, three-thirty-seconds inch. The longest staple in this case varied most.

The staple length was shorter in 1928 than in 1927 except with Express 116 where it was the same for both years, and with D. & P. L. 4 where it was longer in 1928 than in 1927. The personal equation in pulling, however, could have been responsible for these differences. Although in this group the highest yielding variety had the shortest staple and the lowest yielding variety had the longest staple, correlation of long staple and low yields did not apply to the other three varieties. The yield of these other three varieties was not high or low as associated with length of staple. Lightning Express was the second highest in yield and was second longest in staple length. The D. & P. L. 4 was the third highest in lint yield and had a $1\frac{1}{16}$ inch staple.

In section "E" the 2-year average in staple length for Express 121 and Delfos 6102 was $1\frac{1}{8}$ inches; for Delfos 2, $1\frac{3}{32}$ inches; and for Arkansas Acala 37, $1\frac{1}{16}$ inches. Between 1928 and 1929 the staple length varied one-thirty-second of an inch in two of the varieties, Express 121 and Delfos 6102. Such a small variation was more likely to have been an error in measuring than a seasonal cause, as one of the varieties was longer in one year and the other longer in the other year. Staple length did not increase or decrease with the yield among these varieties. The highest yielding variety and the lowest yielding variety in the "E" group both had $1\frac{1}{8}$ inch staple.

In section "F" the 2-year average of Arkansas Rowden 2088 was fifteen-sixteenths of an inch, and that of Wilson Type Big Boll was seven-eighths. The staple length of each variety was one-sixteenth of an inch longer in 1929 than in 1930. Wilson Type Big Boll produced staple untenderable in length in 1930, but this shortness was clearly due to drought.

With the varieties that were grown only in 1927 and tabulated in section "G", the staple lengths were all tenderable, although 13 out of the 15 were fifteen-sixteenths to seven-eighths of an inch in length. The other two varieties of this group Super Seven 1 (Coker) had a staple length of $1\frac{3}{32}$ inches and Trice 323 had a staple length of $1\frac{1}{32}$. Super Seven produced the highest yield of the group and Trice 323 the lowest; however, the yield of the latter was greatly reduced by boll rot. No correlation seemed to exist between staple length and yield in the "G" group.

With the five varieties in section "H", the staple length among these varieties varied from fifteen-sixteenths of an inch to $1\frac{3}{32}$ inches, but there appears to be no relationship between yield and length of staple.

There is also no relationship between staple length and yield among the four varieties grouped in the "I" section. Misdell 1, with the longest staple, had the lowest yield of the four varieties, but the yield of this variety was reduced by wilt infection and probably low stand. The highest yielding variety of the

group had a staple only one-thirty-second of an inch shorter than the Misdell variety.

In the 1930 tests both staple length and the yields were affected by the drought. The stand in 1930 was also irregular. Consequently, the results tabulated in the "J" section may not be very reliable. The staple lengths of the 10 varieties were all above seven-eighths of an inch, except Half and Half (Summer-our) which produced a staple length of three-quarters of an inch. Half and Half was also the highest in yield of the group, but among the other nine varieties there seemed to be no relationship between staple length and yield.

Boll Size. In the results presented in this report, boll size is expressed as the number of bolls required to produce a pound of seed cotton and as the fraction of a pound of lint produced by 100 bolls. The amount of lint from 100 bolls is influenced both by the size of the bolls and the percentage of fiber produced in them. The size of the bolls, particularly the amount of lint to the boll, greatly influences the time required to harvest the crop.⁴ The methods for determining the time required to pick a bale of cotton, however, do not take into consideration the extra time necessary to gather up cotton that has fallen from the burs to the ground, is strung out from the burs and entangled with the branches of the stalks, or is difficult to extract from the burs. Regardless of the boll size, cotton that falls from the burs badly or possesses locks that poorly adhere in the bolls requires more time to harvest. Also cotton that does not mechanically release the locks from the burs to the picker's hand easily, is more slowly harvested. The results of the method by which the number of days required to pick a bale are determined vary somewhat because of the fluctuation in boll sizes. The boll size of a given variety relative to that of other varieties within a similar environment is rather stable. However, there are always slight individual variations, but the amount of experimental error is not sufficiently large to jeopardize reliable distinctions among the three general classes of boll size, small boll varieties, medium boll varieties, and large boll varieties. The varieties for boll size are discussed according to the groups formed in Table 1.

Miller and Arkansas Rowden 40, as recorded in Section "A" of Table 1, are considered big boll cottons, while the boll sizes of the other four varieties of this group are intermediate to small. The amount of lint per boll in none of the six varieties is sufficiently low to slow down harvesting very much, although the larger boll weight of lint in Miller and Arkansas Rowden 40 enables the pickers to harvest these two varieties more rapidly than the other four. The bolls of all six varieties were much

⁴See Arkansas Station Bulletin No. 234, p. 10. A short method by which the number of days required to pick a bale can be computed is to divide the weight of lint from 100 bolls into the factor 3.3333.

smaller in 1930 than in previous years. This decrease was caused by the extremely dry season.

In section "B" it is seen that the boll size of the two varieties Dixie 14 and D. & P. L. 8 of this group was intermediate. In the 3-year average, Dixie 14 had bolls 76.5 of which were required to weight a pound and D. & P. L. 8 had bolls 78.4 of which were required to weigh a pound. With each variety the boll size did not vary greatly from year to year; however, the bolls were generally smaller in 1929 than in the 2 previous years with both varieties. In spite of the fact that the bolls in general were slightly larger in Dixie 14 than in D. & P. L. 8, the amount of lint per 100 bolls was larger with the latter variety than with the former. The difference is accounted for by the fact that the lint percentage was higher in D. & P. L. 8 than in Dixie 14.

As shown in section "C", the 3-year average size of bolls for Arkansas 17 was 83.5 bolls to the pound and for Arkansas Rowden 2119 was 67.3 bolls to the pound. The boll size of each of the two varieties, Arkansas 17 and Arkansas Rowden 2119 was largest in 1928, second in degree in 1929 and smallest in 1930. In the 3-year average Arkansas Rowden 2119 had 0.51 pounds of lint to the 100 bolls and Arkansas 17 had 0.40 pounds of lint to the 100 bolls. The larger boll and slightly higher lint percentage of Rowden 2119 over Arkansas 17 accounts for this difference. The 3-year average lint percentage for Arkansas 17 was 34.0, and the 3-year average lint percentage for Arkansas Rowden 2119 was 35.1.

In four of the five varieties shown in the "D" section the bolls were slightly larger in 1927 than in 1928, but with Williamson 10 they were very nearly the same in both years, being a shade larger in 1928. The actual size of the bolls for the five varieties in the "D" group was relatively small. As shown by the 2-year average, the number of bolls required to produce a pound of seed cotton for D. & P. L. 4 was 73.1, for Dixie-Triumph (Marett) was 73.9, for Express 116 was 75.5, for Williamson 10 was 78.0, and for Lightning Express was 81.4. In the 2-year average, D. & P. L. 4 had the highest lint percentage, 37.0, and Williamson 10 had the lowest lint percentage, 29.2. By this same average the lint percentage of Dixie-Triumph (Marett) was 34.0, Express 116 was 33.8, and Lightning Express was 32.7. Both the size of the boll and the lint percentage affected the weight of lint cotton per 100 bolls. The boll size and the high lint percentage of D. & P. L. 4 placed this variety first for weight of lint per 100 bolls. Williamson 10 was lowest for lint per 100 bolls, yet its boll size for seed cotton was not lowest. The low lint percentage of Williamson 10 reduced the lint per 100 bolls. In the 2-year average the weight of lint per 100 bolls for D. & P. L. 4 was 0.49, for Dixie-Triumph (Marett) and Express 116 was

0.45, for Lightning Express was 0.40, and for Williamson 10 was 0.37 of a pound.

With each variety shown in section "E", the bolls were slightly to somewhat larger in 1928 than in 1929. The bolls in the four varieties were medium in size to small. In the 2-year average, the bolls happened to decrease in size with the yield from one variety to another. Since the yields, the percentage of lint, and the size of bolls each decreased from variety to variety with the increase in wilt percentage, it might be inferred that the disease affected all these attributes, but this relationship is hardly to be expected. However, the disease probably did scale down the yields in this group somewhat proportionally to the amount of wilt present. The amount of lint per 100 bolls also decreased from variety to variety with the decrease in lint percentage and the decrease in the size of boll, as is to be expected.

With the two varieties in the "F" section, the bolls were larger in 1929 than in 1930. The percentage of lint in both varieties was also higher in 1929 than in 1930. The larger bolls and the higher lint percentage in 1929 were reflected in the larger amount of lint to the boll in the former year. The 2-year average of bolls to the pound for Arkansas Rowden 2088 was 69.8 and for Wilson Type Big Boll, 93.0. The amount of lint per 100 bolls for the former variety was 0.50 pounds and for the latter variety was 0.35 pounds.

In the "G" section, among the 15 varieties, Cook 1010-315 had the largest bolls, 61.2 to the pound, and Toole (Bass) had the smallest bolls, 83.7 to the pound. The other 13 varieties varied between these limits. The amount of lint from 100 bolls ranged in somewhat the same manner as the seed cotton weight of bolls; however, variations in lint percentage among the varieties altered this correspondence to some degree.

The boll size in the "H" section is medium to small, ranging among the five varieties from 73.3 to 99.5 to the pound. In spite of the fact that these varieties all have somewhat small bolls, picking was not as tedious as the size of the bolls might indicate, because the lint percentage was medium to high among these varieties and the amount of lint to the boll was not extremely low. However, since the lint percentage with the five varieties was quite constant, the amount of lint from 100 bolls varied with the seed cotton weight of the 100 bolls among these varieties.

The boll size of the four varieties in the "I" section was somewhat small. The lint percentage among these varieties was medium to high, and quite constant. Therefore, the amount of lint obtained from 100 bolls from variety to variety was proportional to the size of the bolls.

As shown in section "J", the lint percentage of the 10 varieties reported in this group probably was not materially affected by the 1930 drought. However, the boll size of these varieties

was considerably reduced in some cases and less in others. The reduction in weight of seed cotton per 100 bolls, in turn affected the amount of lint from 100 bolls.

Seed Weight, Lint Index, and Lock Size. These three determinations are studied together throughout the sections of Table 1, to try to determine their inter-relationships. Lint percentage is also brought into discussion where it is affected by seed size. A high lint percentage in a given variety is caused by one of two conditions, abundance of lint on the seeds or small light seeds. The lock size or seed per lock determination is given to show whether or not a variety with a high lint index has less seed per lock.

As tabulated in section "A", it is observed that the amount of lint per 100 seeds is the highest with Miller and Arkansas Rowden 40, but that the lint percentage of these two varieties is as low or lower than that of the six varieties. Miller and Arkansas Rowden 40 have much heavier seeds than the other four varieties. The lower lint percentage of these two varieties is not because of less lint yield but is a result of heavy seeds. Miller and Arkansas Rowden 40 are good producers of abundant lint and a high tonnage of seed. With the six varieties in general, as the seed weight increases the lint index increases and vice versa. The lint percentage of Super Seven is equivalent to that of Miller, but the lint index of the former variety is much lower than with the latter. The actual amount of lint yield was much higher with Miller than with Super Seven, although the lint percentage of the two varieties was the same. If the seed size of Super Seven were as great as the seed size of Miller and no change in lint index of the two varieties took place, the lint percentage of Super Seven would have been much lower than that of Miller. The high lint percentage of D. & P. L. 6 was caused more by light seeds than by abundance of lint. In 1930 both the weight of 100 seeds and the lint index were lower in practically every instance than in the 3 previous years. These two determinations for each of the six varieties were lower in 1930 than the 4-year average. The decrease in seed weight and in the amount of lint from 100 seeds must have been attributable to the drought alone. Since the weight of the seed and the weight of the lint both decreased together, the seasonal effect on the lint percentage was not material. The seed per lock seemed to be higher in 1928 than in any other year. The season must have been more favorable to lock development in 1928 than in other years; however, the larger number of seed per lock did not seem to affect the size of boll. Of the six varieties in the "A" group the two varieties that have the highest lint index have the largest number of seed per lock. With the other four varieties the tendency is for the smaller number of seeds per lock to accompany a lower lint index.

As shown for Dixie 14 and D. & P. L. 8 in section "B", the 3-year average seed size of these two varieties was practically the same. In this case lint percentage and lint index were associated. In both varieties the seeds were heaviest in 1927 and lightest in 1929. The lint index of both varieties was slightly higher in 1928 and somewhat lower in 1929 than in 1927. In the 3-year average of the two varieties the one with the higher lint index had slightly the higher seed per lock average. With each of the two varieties the year in which the lint index was highest the seed per lock average was also higher than in the other 2 years, but in the year in which the lint index was lowest the seed per lock average was not lowest. The seed per lock average was second in degree in the year when the lint index was lowest, and the seed per lock average was lowest in the year in which the lint index was second in rank.

With both varieties, section "C", Arkansas 17 and Arkansas Rowden 2119, the seeds were heavier, the lint index higher, and the seed per lock average larger in 1928 than in 1929 and 1930. The seed weight in each variety was much lower in 1929 and 1930. Of the last 2 years, seed weight in both varieties was slightly lower in 1929 than in 1930. The lint index of Arkansas 17 was about the same in the last 2 years as was also the lint index for Arkansas Rowden 2119. In 1929 and 1930 with each of the two varieties, where the lint index was slightly higher, the seed per lock was also slightly higher. In the 3-year average the seed weight of Arkansas Rowden 2119 was higher than the seed weight of Arkansas 17, but the lint index in the former variety was sufficiently above that of the latter to bring the lint percentage of Arkansas Rowden 2119 above the lint percentage of Arkansas 17. Along with the higher lint index of Rowden 2119, over that of Arkansas 17, is found the higher seed per lock mean.

In 1927, section "D", the weight of seed in the four varieties, Dixie-Triumph (Marett), Lightning Express, D. & P. L. 4 and Express 116, was higher than in 1928. The seed weight for Williamson 10 was practically the same both years. The lint index with Dixie-Triumph (Marett), D. & P. L. 4, and Express 116 was somewhat higher in 1927 than in 1928, but in 1928 the lint index of Lightning Express and Williamson 10 was slightly higher than in 1927. The mean seed per lock was slightly to somewhat higher in 1928 than in 1927 for each of the five varieties. In the 2-year average the weight of 100 seeds in grams for Express 116 was 13.48, for Williamson 10 was 13.15, for D. & P. L. 4 was 12.07, for Dixie-Triumph (Marett) was 11.43, and for Lightning Express was 11.37. In the check of Trice 304, the weight of 100 seeds was 11.00 grams. The lint index in the 2-year average for D. & P. L. 4 was 7.43, for Express 116 was 7.16, for the check was 6.19, for Dixie-Triumph (Marett) was

6.16, for Lightning Express was 5.72, and for Williamson 10 was 5.67. The highest lint index occurred with the variety third highest in seed size and with the highest lint percentage. The second highest lint index occurred in Express 116, the variety having the heaviest seed and an intermediate lint percentage. In this variety the lint percentage was lowered by heavy seed rather than by lower lint production. Williamson 10 had a very low lint percentage (29.2), more because the seeds were heavy than because lint was low in production. However, this variety had the lowest lint index of the group. The check which is compared with this group of varieties had a lint index somewhat higher than that of Williamson 10, but its seed weight was much lower than that of Williamson 10. The lint percentage of the check was 35.1. Since Dixie Triumph (Maret) and Lightning Express have seed weights of about the same magnitude, the lint index and the lint percentage of these varieties correlate. Dixie-Triumph (Maret) has a higher lint index, as well as a higher lint percentage, than Lightning Express. The 2-year average of the mean seed per lock in this group of varieties does not rise and fall or the reverse with lint index. The higher mean seed per lock is generally associated with the higher lint indexes. It certainly cannot be concluded that varieties with lower lint indexes have more seed per lock.

As shown in the "E" section, the weight of seeds was higher in 1928 than in 1929 with three of the varieties. This weight was practically equal both years with Delfos 2. The lint index was materially larger for the four varieties in 1928 than in 1929. The mean number of seed per lock with the four varieties was also slightly higher in 1928 than in 1929. This indicates that more seed per lock tends to be associated with more lint per seed. In reference to the seed weight and the lint index, it is noted again that the percentage of lint was slightly higher in 1928 than in 1929. The amount of lint from 1928 to 1929 fell off relatively more than did the weight of seed. In the 2-year average the lint index of Express 121 and Arkansas Acala 37 was identical. The seeds of the Express 121 were slightly lighter than those of Arkansas Acala 37, so also was the lint percentage of Express 121 slightly higher than the lint percentage of Arkansas Acala 37. The relatively low lint index and the relatively low seed weight of the two Delfos strains indicates how the lint percentage may be maintained at a respective level and yet have low amounts of lint produced. This condition is also illustrated in the check variety. In the 2-year average of the varieties in this group, the mean seed per lock did not decrease from variety to variety with lower lint index.

As shown in section "F", the seed weight of Arkansas Rowden 2088 was practically the same for both years, but the lint index was higher for this variety in 1929 than in 1930. The

higher lint index in 1929 was reflected in the lint percentage for that year, since the seed weight was about the same for both years. Both the seed weight and the lint index of Wilson Type Big Boll were somewhat higher in 1930 than in 1929. The proportionately larger decrease of seed weight than lint index in 1929 with Wilson Type Big Boll accounts for the somewhat higher lint percentage for this variety in that year than in 1930. The 2-year average seed weight for Arkansas Rowden 2088 was 12.35 gm. and for Wilson Type Big Boll, 10.02 gm. The seed weight of the check average was 9.03 gm. This strain of Rowden had larger seeds than Wilson Type Big Boll and the check variety had very small seeds. Comparing the averages of each of the two varieties and the check, it appears that the heavier the seeds the higher is the lint index. In the 2-year average of each variety and the check, from variety to variety, the mean seed per lock decreased with the lint index.

In sections "G", "H", "I", and "J", are given the seed weight, lint index, and lock size data of varieties tested one year only. As the results represent a single year test, the data are presented without interpretation.

Varietal Evaluations. As previously stated certain varieties have been excluded and others included during the course of the 4 years of experiments. As soon as a variety was found undesirable from the standpoint of wilt resistance or thought to be unsatisfactory for other economic qualities, it was eliminated from the tests. New strains or other commercial varieties which came to attention during the later period of the work were substituted for the discarded varieties.

The 15 varieties in the "G" section of Table 1 were tested in 1927 only. The first year test at the Cotton Branch Experiment Station was begun with a larger number of varieties than was planned to carry through the several years' work. Varieties having a reputation for wilt resistance were collected from different parts of the cotton belt, but it was soon found that several of these were unsuited to Arkansas conditions or had characteristics thought at that time to be undesirable in a variety. In 1927 it was decided to discard all varieties having less than one-inch staple and extremely small wasty bolls, excepting those that were outstanding for wilt resistance, yields and other desirable qualities. None of the 15 varieties had a sufficient percentage of wilt infection to be thrown out only on this account. Eight of the varieties were as low or lower in yield than the check variety and at the same time had a staple seven-eighths to fifteen-sixteenths of an inch. Trice 323, the lowest variety of this group in yield, had a staple of 1 $\frac{1}{32}$ inches, a fair lint percentage, and other desirable characteristics, but its yield was cut very low by an unusually high percentage of boll

rot. The other six of the 15 varieties produced better lint yields than the check variety. The check variety, Trice 304, was very low in yield throughout the experiments by reason of the fact that a large percentage of its plants always wilted. In the case of the six varieties that produced a better yield than the check variety, other undesirable characteristics were found. Cleveland 4 (Wannamaker) had a yield only 7 per cent better than the check, and had a seven-eighths of an inch staple. Toole (Petty) had a yield only 8 per cent better than the check variety, had small bolls, and a fifteen-sixteenths of an inch staple. Council Toole and Lewis 63 produced lint yields considerably better than the check variety, but these two varieties had small bolls and a twenty-nine-thirty-seconds of an inch staple. Cook Improved produced a lint yield 31 per cent better than the check yield, but it had a seven-eighths of an inch staple. Super Seven 1 (Coker) produced an outstanding yield and had good staple, but it was decided to carry only one of Coker's Super Seven strains in the tests.

Twenty-eight varieties, besides the check variety, were included in the 1927 tests. As shown above, 15 of these were eliminated after the first year, leaving 13 of the 1927 varieties in the 1928 tests. Five of the 13 were eliminated at the end of the 1928 test, two at the end of the 1929 test, and six were carried throughout the 4-year period. The five varieties discarded from the tests at the end of 1928 were Dixie-Triumph (Marett), Lightning Express, D. & P. L. 4, Express 116, and Williamson 10. The results for these five varieties are grouped in section "D". Dixie-Triumph (Marett) was eliminated, because another strain of this variety was being run in the test. Lightning Express was discarded, because of its small boll and poor picking quality, which makes it unpopular with growers. D. & P. L. 4 was not as highly recommended for yields and other production qualities by the breeder of this strain as the D. & P. L. 6 and D. & P. L. 8, and consequently it was eliminated. It was also necessary to discard one of the D. & P. L. strains from the tests to make room for another variety. The results as shown in this report indicate that D. & P. L. 6 produced more lint, was more resistant to wilt, and had a longer staple than D. & P. L. 4. However, D. & P. L. 8 produced about the same yield of lint as D. & P. L. 4, was more susceptible to wilt than D. & P. L. 4, and had about the same length of staple as D. & P. L. 4. D. & P. L. 8 was discarded from the test at the end of 1929. Express 116 was eliminated, because this variety had a considerable susceptibility to wilt. Williamson 10 was discarded for its low productivity, its lateness, and its low percentage of lint. The two varieties discarded at the end of the 1929 test were Dixie 14 and D. & P. L. 8. The results of these two varieties are grouped in section "B". Because the staple of Dixie 14 was thought to be too short for

Arkansas conditions and because the D. & P. L. 8 strain had a considerable percentage of wilted plants, these two cottons were discarded from the wilt test after 1929. However, since, after computing results of these experiments, Dixie 14 was found to be the most resistant of all varieties grown as long as 3 years, this variety was put back in the test for 1931.

The six varieties begun in the test in 1927 and continued through the 4-year period are either classed as wilt resistant or wilt tolerant, produce good yields, and are recommended for wilt infested soils. These are Dixie-Triumph (Watson), Miller, Super Seven (Coker), D. & P. L. 6, Cleveland 54, and Arkansas Rowden 40. These six varieties were continued in the 1931 test.

Along with the 13 varieties of the 1927 test that were continued in 1928, eleven other varieties were added. Five of these additional varieties were tested in 1928 only. These were Triumph 44-13, Delfos 1341, Trice 322, Arkansas Acala 31, and Arkansas Acala 33. The data for these five varieties are included in the "H" section. Triumph 44-13 produced an excellent yield of lint, had a very high lint percentage, but was slightly less than an inch in staple, and had a 20 per cent wilt infection. Delfos 1341 and Trice 322 had yield indexes of 117 and 115, respectively, which were not exceptional productions. These two varieties had very small bolls and wilted badly. Arkansas Acala 31 and Arkansas Acala 33 produced lint yields practically as low as the check variety, and both proved to be rather susceptible to wilt infection.

Of the six remaining varieties which were started in the tests in 1928, four were discontinued after 1929. These varieties were Express 121, Arkansas Acala 37, Delfos 2, and Delfos 6102. The data for these four varieties are given in section "E". Three of these varieties, Arkansas Acala 37, Delfos 2, and Delfos 6102, were removed from the test, because they had demonstrated their susceptibility to wilt. Express 121 hardly had a sufficient percentage of the disease alone to warrant removal from further trial, but because of the fact that Express has small bolls and poor picking quality, another variety was substituted for this one.

The two remaining varieties which were begun in 1928 and continued through 1930 were Arkansas 17 and Arkansas Rowden 2119. The data for these two varieties are presented in section "C". Based upon the percentage of plants wilted Arkansas 17 and Arkansas Rowden 2119 are classed as wilt tolerant. These varieties are both recommended for wilt infested land; however, Arkansas 17 had a lower percentage of plants wilted than Arkansas Rowden 2119. They are both continued in the 1931 test.

Along with the eight varieties begun in the 1927 test and the six varieties begun in the 1928 test, six additional varieties were included in the 1929 test. Four of the additional six varie-

ties were grown in 1929 only. These varieties were Super Seven (Isgrig), Arkansas Rowden 1034, Arkansas Rowden 1077, and Misdal 1. The data for these four varieties are given in section "I". Misdal 1 was eliminated because the percentage of wilt infection in this variety was high and because its lint yield was no better than the check yield. The high wilt incidence was, no doubt, responsible for reduced production. Arkansas Rowden 1034 had desirable characteristics as a Rowden strain, though its bolls were somewhat small. Since this strain had a larger percentage of wilt infection, 14.1 per cent, than some of the other Rowden strains, it was not further continued in the tests. Arkansas Rowden 1077 produced a fair yield and did not have a high percentage of wilt infection, being 7.9 per cent, but this strain had very small bolls and did not have much storm "proofness." Hence Arkansas Rowden 1077 was discarded from the tests. Super Seven (Isgrig) was a good wilt resisting strain of the Super Seven variety; however, since it was decided to carry only one strain of Super Seven in the tests this one was discarded.

The two remaining varieties which were added in 1929 were continued in 1930. These varieties were Arkansas Rowden 2088 and Wilson Type Big Boll. The data for these two varieties are tabulated in section "F". Arkansas Rowden 2088 and Wilson Type Big Boll were continued in the 1931 test. These varieties are good producers of lint and have other desirable characteristics, especially the Rowden strain. Arkansas Rowden 2088 may be classed as wilt tolerant, while it should be said that Wilson Type Big Boll is more susceptible to wilt than is desirable in a so-called wilt resistant variety. However, the latter variety is also placed in the wilt tolerant group.

Along with the six varieties begun in 1927, the two varieties begun in 1928, and the two varieties begun in 1929, ten additional varieties were included in the 1930 test. The data for the ten additional varieties are given in section "J". Seven of these ten varieties were continued in the 1931 test. The year 1930 alone, since the season was very dry and the stand poor in some cases, does not furnish a very reliable yield test. The incidence of wilt was generally lower also in 1930 than in previous years. However, Half and Half had a high percentage of infected plants and Misdal 2 showed a considerable susceptibility to the disease. Among the other 8 varieties the number of wilted plants varied somewhat, but none of the counts were high.

From the standpoint of the results as a whole, 15 varieties and strains of the 56 studied in the series of experiments stand out as the more important. Since 1930 was an unfavorable year for the test, none of the varieties that were tried the last year only have been included in this special list. This list also does not include any other varieties tested for one year only. Some

of the varieties in the special list were dropped from the tests prior to 1930, but this elimination was not purely on the basis of merit, but rather in some cases because of popular prejudice or the current idea at the time of the change that another variety was more worthy of the place in the test than the one in question. The special list of 15 are as follows:

Wilt Resistant	{	Dixie-Triumph (Watson)
		Dixie-Triumph (Marett)
		Dixie 14
		Lightning Express
		Super Seven (Coker)
		Miller
Wilt Tolerant	{	Arkansas Rowden 40
		Arkansas 17
		Arkansas Rowden 2088
		D. & P. L. 6
		Express 121
		D. & P. L. 4
		Cleveland 54
		Arkansas Rowden 2119
		Wilson Type Big Boll

Both Watson's and Marett's strains of Dixie-Triumph, Dixie 14, Lightning Express, Super Seven, and Miller produced high yields of lint and were highly resistant to wilt. None of these six varieties had over 3 per cent of their plants attacked by wilt. Dixie 14 was remarkably free of wilt having an average of 0.2 per cent only in the 3 years in which it was tested. During the 2 corresponding years in which both strains of Dixie-Triumph were run, Marett's strain was the more resistant. The first six varieties on the special list are classified as wilt resistant.

The other nine varieties in the special list showed good lint yields and ranged in percentage of wilted plants from 3.5 to 7.2 per cent. This group of varieties is classified as wilt tolerant. Among the nine varieties Arkansas Rowden 40 was the most tolerant and Wilson Type Big Boll was the least.

In the list of 15, the yield of lint did not increase or decrease from variety to variety with the length of staple in any noticeable manner. The two varieties with longest staple were first and third in yield. These two varieties were Express 121 and Lightning Express. The two strains of Dixie-Triumph were around fifteen-sixteenths of an inch in staple length and had identical yields both standing at second place. Miller with an 1 $\frac{1}{32}$ -inch staple stood fourth in yield while Wilson Type Big Boll with seven-eighths of an inch staple stood lowest of the group in yield. With the other six varieties, no association between yield of lint and length of staple was shown.

The 15 varieties may be ranked by any one of several groupings: according to staple length, according to boll size, according to relative earliness, or according to relative yield.

The varieties classed as long staple are Lightning Express, Express 121, Arkansas 17, and D. & P. L. 6. Super Seven, D. & P. L. 4, Miller, and Arkansas Rowden 40 are classed as intermediate staples. Arkansas Rowden 2119, Arkansas Rowden 2088, Dixie 14, Dixie-Triumph (Watson), Cleveland 54, Dixie-Triumph (Marett), and Wilson Type Big Boll are classed as short staples. However, each of these short staple varieties has tenderable lengths.

Miller and the three Rowden strains are classed as big boll cottons. D. & P. L. 4, Express 121, Dixie-Triumph (Marett), Dixie 14, Cleveland 54, and Dixie-Triumph (Watson) are classed as varieties having bolls intermediate in size. Super Seven, D. & P. L. 6, Arkansas 17, Lightning Express, and Wilson Type Big Boll are classed as small boll varieties.

None of the list of 15 varieties was of the extreme early type as was the check variety, Trice 304. However, the varieties classed as early are sufficiently early in the average year. The earlier varieties in the group are D. & P. L. 6, Wilson Type Big Boll, Arkansas Rowden 40, Arkansas Rowden 2119, Arkansas Rowden 2088, Cleveland 54, Super Seven, Miller, Lightning Express, and Arkansas 17. The varieties intermediate in maturity are Dixie-Triumph (Watson), D. & P. L. 4, and Express 121. The varieties quite late in maturity are Dixie 14 and Dixie-Triumph (Marett). The degree of earliness among these varieties had no effect on the yield of lint. As measured by the yield index, the earliest variety ranked seventh in yield, and the second earliest variety was thirteenth in yield. Two varieties intermediate in maturity held first and second places in yield. The two varieties classed as late in maturity ranked third and ninth in yield, respectively.

The 15 varieties, ranked according to the decreasing order of the yield index, appear as follows: Express 121, Dixie-Triumph (Watson), Dixie-Triumph (Marett), Lightning Express, Miller, Super Seven, D. & P. L. 6, Cleveland 54, Arkansas Rowden 2088, Arkansas 17, Dixie 14, Arkansas Rowden 2119, D. & P. L. 4, Arkansas Rowden 40, and Wilson Type Big Boll.

SUMMARY AND CONCLUSIONS

The cotton wilt work begun in 1926 at Galloway and transferred to the Cotton Branch Experiment Station in Lee county in 1927 is still in progress at the latter location. The work of the first 2 years, 1926 and 1927, is reported in Bulletin No. 224 of this Station. The present report embraces a summary of the data for the 1927 work and the field results obtained in the three following years, 1928, 1929, and 1930.

From the seasonal counts of wilted plants it appeared in general that where a variety had a high percentage of diseased plants at the end of the season, the incidence of the disease was also somewhat pronounced earlier in the season. This condition indicates that with a wilt susceptible variety the damage to plants begins sufficiently early to prevent these plants from developing much cotton. If infection did not begin until late in the season, the plants would have an opportunity to produce a fair crop before the disease arrested further growth.

The total stand in the tests was affected by factors other than death from the attacks of the wilt organism. Weather conditions and unequal thinning both affected the stand. However, except in the case of a few of the varieties, the lack of a standard number of plants to a given area did not seem to alter yields. There was more irregularity in the stand in 1930 than in the previous years. In the varietal averages there was little apparent association of thinner stands and reduced yields.

Small percentages of wilt infection did not materially affect yields; but where the larger counts of wilted plants occurred, the yields were generally lower. The presence of wilt in the check variety seemed to be the chief contributing factor to lowered production.

Wilt susceptibility and earliness in several instances seemed to be correlated. This relationship was most pronounced in the check variety. However, early varieties were not always highly susceptible nor were late varieties largely immune to the wilt disease. Wilt resistance is a varietal characteristic seemingly not associated with the seasonal development and the time of maturity of the plant.

Wilt resistance apparently was in no way associated with varietal characteristics, such as lint percentage, staple length, boll size, seed size, lint index, or seed per lock. However, if the determinations had been made on the plants that wilted only, several of these varietal characteristics might have been altered. The data giving the determinations of staple length, size of bolls, weight of seeds, lint index, and seed per lock are presented to aid in evaluating the varieties from standpoints other than that of the wilt relationship.

The relationship of the weight of the seed to the amount of fiber ginned from these seed shows why the lint percentage may be high, intermediate, or low. A high lint percentage may be caused by light or faulty seed rather than by the abundance of lint. High lint percentage results more often in an apparent high yield than in an actually high yield. High lint yield is, in general, associated with large and heavy seeds. Wherever the seed weight is high, the lint index is usually high. A relatively low lint index and a relatively low seed weight maintains the lint percentage at a fairly high level, even though low amounts of

lint are produced. On the other hand, with heavy seeds a low lint percentage may accompany abundant lint production.

With high lint index or an abundance of lint per seed is associated large locks. With the increase of lint weight per seed the number of seed in the lock is not lowered.

Staple length did not seem to be associated with lint yield. From variety to variety yield did not decrease with an increase in staple length.

Several of the 15 best varieties are satisfactory for recommendation to Arkansas farmers for wilt infested lands. On bottom or delta land where staple cotton is desired, Arkansas 17, D. & P. L. 6, or Lightning Express should be grown. These varieties are good substitutes for Delfos where wilt is a factor. On these same lands where staple of intermediate length is wanted, Super Seven, Miller, or Arkansas Rowden 40 should be chosen. Miller and Arkansas Rowden 40 belong to the big boll group of varieties. On upland where intermediate staple is to be chosen Miller, and Arkansas Rowden 40 should be selected for soils containing wilt. Where short staple is desired either on wilt infested bottom lands or on wilt infested upland, Dixie-Triumph or Dixie 14 should be planted.

Several varieties, such as Cleveland 54, Arkansas Rowden 2088, Arkansas Rowden 2119, D. & P. L. 4, Express 121, and Wilson Type Big Boll, are classed as wilt tolerant and are satisfactory on wilt soil, unless the infestation is of an intense nature.

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APPENDIX

The appendix Tables 1, 2 and 3 embrace the 1928, 1929, and 1930 plant counts. The total plants per row were enumerated at the beginning of the counting season. At intervals as indicated in the respective tables the wilted plants were counted in each series and the total number of diseased plants added at the close of the season. The data in the tables represent the average of the three series of the annual test. The number of plants wilted through the seasonal counts are expressed as a percentage of the total original number of plants. The 1928 data are given in Table 1; 1929, Table 2; and 1930, Table 3.

Tables 4, 5, and 6 embrace the acre rate of stand, the percentage of plants wilted, the percentage of earliness, the acre yield of seed cotton, the percentage of lint, the acre lint yield, the increased or decreased lint yield of the varieties over the check row lint yield, the staple length, the bolls required for a pound of seed cotton, the weight of lint from 100 bolls, the weight per 100 seeds in grams, the lint index, and the average number of seeds per lock. The 1928 data are presented in Table 4; 1929, Table 5; and 1930, Table 6. These tables represent the compiled averages of the three series.

TABLE 1. DEVELOPMENT OF COTTON WILT IN WILT RESISTANT AND WILT SUSCEPTIBLE VARIETIES IN ARTIFICIALLY INOCULATED LAND AT THE COTTON BRANCH EXPERIMENT STATION, 1928¹

Row No.	Variety, strain and source	Plants, July 26	Wilt, July 26	Wilt, Aug. 8	Wilt, Aug. 22	Wilt, Sept. 7
		Num-ber	Per cent	Per cent	Per cent	Per cent
1-ck	Trice 304 (Ark. Sta.) -----	681	17.0	29.1	29.5	44.3
2	Dixie Triumph (Watson) -----	703	.28	.99	1.1	3.8
3	Dixie Triumph (Marett) -----	751	.13	.39	.39	.79
4	Dixie 14 (Humco) -----	655	0	.30	.30	.45
5	Cleveland 54 (Miss. Sta.) -----	656	3.81	6.4	6.5	7.7
6-ck	-----	1,216	9.45	16.6	19.0	30.3
7	Miller (Miss. Sta.) -----	706	.70	.99	.99	1.5
8	D. & P. L. 4 -----	600	4.83	6.1	6.1	7.8
9	D. & P. L. 8 -----	503	6.75	13.7	13.7	17.4
10	Arkansas Rowden 40 (Ark. Sta.) -----	633	.90	1.2	1.57	4.4
11-ck	-----	637	17.5	30.3	31.0	37.8
12	Arkansas Rowden 2119 (Ark. Sta.) -----	707	.70	2.2	2.5	4.8
13	Triumph 44-32-13 (Okla. Sta.) -----	710	4.66	8.0	8.1	20.0
14	Arkansas Acala 37 (K. & H.) -----	675	10.0	11.1	11.1	12.8
15	Arkansas Acala 33 (Ark. Sta.) -----	543	13.0	18.2	18.2	19.7
16-ck	-----	1,034	15.1	23.0	24.6	36.6
17	Arkansas Acala 31 (Ark. Sta.) -----	423	6.5	7.8	7.8	14.4
18	Trice 322 (Ark. Sta.) -----	567	5.9	8.2	8.4	21.1
19	Arkansas 17 (Ark. Sta.) -----	410	2.2	2.9	3.6	4.1
20	Express 116 (Ark. Sta.) -----	435	5.9	6.9	7.5	16.5
21-ck	-----	705	18.1	25.2	25.2	37.0
22	Express 121 (Miss. Delta Sta.) -----	713	1.5	2.8	2.8	4.9
23	L. Express 7 (Coker) -----	565	.17	.17	.17	.17
24	D. & P. L. 6 -----	491	1.6	2.03	2.03	2.6
25	Delfos 1341 (Miss. Delta Sta.) -----	739	13.1	24.4	24.4	36.3
26-ck	-----	1,087	8.3	16.1	16.4	33.0
27	Delfos 2 (Ston. Ped. S. Co.) -----	697	12.0	19.6	19.6	27.2
28	Delfos 6102-324 (Ston. Ped. S. Co.) -----	641	12.9	21.9	21.9	36.0
29	Williamson 10 (Humco) -----	397	1.2	2.01	2.01	2.01
30	Super-Seven 4 (Coker) -----	689	.87	.87	.87	.87
31-ck	-----	683	17.4	28.5	28.5	39.8

¹The results are the combined data from Series I, II and III.

TABLE 2. DEVELOPMENT OF COTTON WILT IN WILT RESISTANT AND WILT SUSCEPTIBLE VARIETIES IN ARTIFICIALLY INOCULATED LAND AT THE COTTON BRANCH EXPERIMENT STATION, 1929¹

Row No.	Variety, strain and source	Plants, June 28	Wilt, June 28		Wilt, July 8		Wilt, July 18		Wilt, July 29		Wilt, Aug. 10		Wilt, Aug. 20		Wilt, Aug. 30	
		Number	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
1-ek	Trice 204 (Ark. Sta.)	583	3.9	10.6	14.4	20.4	23.6	39.6	42.1							
2	Dixie-Triumph (Watson)	597	0	.50	.50	.50	.50	1.0	1.5							
3	Wilson Type Big Boll	737	1.5	3.1	4.0	4.0	4.2	6.6	9.3							
4	Dixie 14 (Hume)	399	0	0	0	0	0	0	0							
5	Cleveland 54 (Miss. Sta.)	619	1.3	3.5	4.5	5.6	5.6	5.6	5.6							
6-ek	Miller (Miss. Sta.)	611	3.9	8.0	14.5	16.5	21.9	40.9	40.9							
7	D. & P. L. 8	670	1.5	3.5	5.5	8.9	8.9	1.6	1.6							
8	Arkansas Rowden 40 (Ark. Sta.)	665	1.9	3.9	5.5	6.6	9.7	14.5	17.3							
9	Arkansas Rowden 2119 (Ark. Sta.)	499	.80	1.0	1.0	1.6	2.6	4.2	4.6							
10	Arkansas Rowden 2119 (Ark. Sta.)	521	.76	1.3	2.6	3.2	4.2	6.9	9.0							
11-ek	Arkansas Rowden 1034 (Ark. Sta.)	579	3.1	8.4	11.0	17.6	22.4	35.7	43.1							
12	Arkansas Rowden 1077 (Ark. Sta.)	638	1.5	3.6	6.4	7.9	10.8	13.3	13.3							
13	Arkansas Rowden 2088 (Ark. Sta.)	630	1.6	4.7	6.5	6.5	6.5	7.7	7.7							
14	D. & P. L. 6	606	.33	1.1	1.4	1.4	1.8	3.3	4.1							
15	Arkansas 17 (Ark. Sta.)	530	5.0	11.8	16.4	22.8	31.1	46.9	46.9							
16-ek	Express 121 (Miss. Delta Sta.)	672	.44	1.6	1.7	2.5	2.9	5.5	5.7							
17	Miscel 1 (Miss. Delta Sta.)	631	.31	1.2	1.4	1.4	1.7	2.9	3.3							
18	Delfos 6102 (Ston. Fed. S. Co.)	450	4.6	7.1	12.0	17.3	18.2	25.3	25.3							
19	Delfos 6102 (Ston. Fed. S. Co.)	516	3.6	4.8	9.3	15.6	19.5	35.4	35.4							
20	Delfos 6102 (Ston. Fed. S. Co.)	576	5.5	9.0	14.9	21.1	25.0	40.4	40.4							
21-ek	Delfos 2 (Ston. Fed. S. Co.)	569	2.1	6.5	10.7	15.1	21.3	30.6	30.6							
22	Super Seven 5 (Coker)	491	.61	.77	.77	.77	.77	.77	.77							
23	Super Seven 5 (Coker)	656	1.5	4.5	5.1	8.3	8.3	1.9	1.9							
24	Super Seven 5 (Coker)	598	1.8	4.5	5.1	8.3	8.3	15.7	15.7							
25	Arkansas Acala 37 (K. & H.)	554	4.1	11.7	19.3	24.7	32.3	42.7	43.6							

¹The results are the combined data from Series I, II and III.

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TABLE 3. DEVELOPMENT OF COTTON WILT IN WILT RESISTANT AND WILT SUSCEPTIBLE VARIETIES IN ARTIFICIALLY INOCULATED LAND AT THE COTTON BRANCH EXPERIMENT STATION, 1930¹

Row No.	Variety, strain and source	Plants, July 8	Wilt, July 8		Wilt, July 17		Wilt, Aug. 5		Wilt, Aug. 25		Wilt, Sept. 5	
		Number	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
1-ck	Trice 304	1,374	2.7	2.7	2.7	3.5	4.8	7.3	14.5			
2	Arkansas 17 (Ark. Sta.)	886	.45	.45	.45	.45	.45	.45	.45			
3	Express 317 (La. Sta.)	904	.33	.33	.33	.33	.33	.33	.33			
4	Miscel 2 (Miss. Delta Sta.)	1,175	1.6	1.6	3.1	3.1	3.1	5.0	9.6			
5	Delfos 668 (La. Sta.)	638	2.0	2.0	2.0	2.0	2.0	2.1	7.1			
6-ck	Super Seven 5 (Coker)	1,367	1.4	2.3	2.3	3.4	6.1	7.6	15.9			
7	D. & P. L. 6	915	1.3	1.3	1.3	1.3	1.9	2.8	5.8			
8	Arkansas Rowden 2119 (Ark. Sta.)	1,096	.55	.82	.82	.82	.91	1.7	5.6			
9	Arkansas Rowden 2119 (Ark. Sta.)	696	1.3	1.3	1.3	1.3	1.4	1.6	4.5			
10	Pinkie Triumph (Watson)	441	.23	.23	.23	.23	.23	.23	.23			
11-ck	Half and Half (Summerour)	1,041	2.3	2.6	2.6	3.3	5.5	7.8	14.9			
12	Arkansas Rowden 40 (Ark. Sta.)	626	4.5	5.9	5.9	5.9	5.9	11.2	16.4			
13	Wilson Tyne Big Boll	703	.14	.14	.14	.57	.71	1.3	3.0			
14	D. & P. L. 10	801	1.1	1.9	1.9	1.9	1.9	2.9	4.6			
15	Arkansas Rowden 2083 (Ark. Sta.)	1,060	1.1	1.1	1.1	1.3	2.0	3.4	6.7			
16-ck	Cleveland 54 (Miss. Sta.)	1,373	2.4	2.4	2.4	3.3	5.1	6.0	12.7			
17	Arkansas Rowden 2083 (Ark. Sta.)	1,147	1.2	1.4	1.4	1.4	1.4	2.1	6.4			
18	Wilt Cleveland 23-5 (Coker)	785	.38	.64	.64	.64	.64	1.1	4.3			
19	Wilt Cleveland 23-5 (Coker)	582	1.0	1.0	1.0	1.0	1.0	1.0	2.9			
20	Arkansas Acala 34 (Ark. Sta.)	1,222	1.9	2.4	2.4	2.4	2.9	3.2	6.4			
21-ck	Arkansas Rowden 3053 (Ark. Sta.)	1,763	.56	.56	.56	.56	.56	.56	.56			
22	Miller (Miss. Sta.)	1,106	.72	.80	.80	.80	.80	1.3	5.0			
23	Arkansas Rowden 3054 (Ark. Sta.)	519	.57	.57	.57	.57	.57	1.6	5.1			
24	Arkansas Rowden 4053 (Ark. Sta.)	1,353	2.5	2.5	2.5	2.5	2.5	2.5	2.5			
25	Arkansas Rowden 4053 (Ark. Sta.)	1,353	2.5	2.5	2.5	2.5	2.5	2.5	2.5			
26-ck	Arkansas Rowden 4053 (Ark. Sta.)	1,353	2.5	2.5	2.5	2.5	2.5	2.5	2.5			

¹The results are the combined data from Series I, II and III.

TABLE 4. VARIETIES TESTED IN 1928 AT THE COTTON BRANCH EXPERIMENT STATION

Order plant- row No.	Variety, strain and source	Plants	Plants wilted	Earli- ness	Total yield seed cotton	Lint	Lint yield	Lint gain over check	Staple length	Bolls to the pound	Lint from 100 bolls	Weight of 100 seed bolls	Lint index	Seed per boll
		Num- ber	Per cent	Per cent	Pnds	Per cent	Pnds	Pnds	32nds ¹	Num- ber	Pnds	Grams		Num- ber
1	Trice 304 (Ark. Sta.)	10,215	44.3	81.9	623	36.4	227	---	32	97.6	36	3.77	3.84	7.82
2	Pixie Triumph (Watson)	10,545	3.8	52.3	1,376	36.7	505	271	30	77.7	15	10.37	6.36	8.34
3	Pixie Triumph (Marrett)	11,265	0.6	42.7	1,384	34.8	482	241	28	78.6	13	10.71	6.38	8.52
4	Dixie 14 (Hunco)	9,825	0.3	39.6	1,177	37.9	446	199	29	77.5	17	10.51	6.39	8.61
5	Cleveland 54 (Miss. Sta.)	9,840	7.7	56.8	1,131	36.2	409	155	31	74.4	17	11.38	6.38	8.10
6	Miller (Miss. Sta.)	18,240	30.3	79.7	717	36.4	261	---	31	92.2	38	10.32	6.32	7.74
7	D. & P. L. 8	10,590	1.5	56.8	1,203	34.4	414	160	34	58.2	31	13.92	7.71	8.18
8	D. & P. L. 8	9,000	7.6	53.1	927	38.2	354	106	34	76.8	18	10.98	7.18	8.53
9	D. & P. L. 8	7,545	17.1	64.0	924	40.3	372	131	34	76.5	52	16.81	7.60	8.39
10	Arkansas Rowden 40 (Ark. Sta.)	9,495	4.4	66.1	1,056	34.3	362	127	34	59.6	57	11.59	7.86	8.56
11	Arkansas Rowden 2119 (Ark. Sta.)	9,555	37.8	80.7	622	36.6	228	---	30	94.4	38	9.73	8.81	8.41
12	Arkansas Rowden 2119 (Ark. Sta.)	10,605	4.8	60.9	1,096	34.8	381	151	32	59.7	57	11.86	8.15	8.77
13	Triumph 44-32-13 (Okla. Sta.)	10,650	20.0	72.2	1,052	37.9	391	160	31	73.3	49	10.78	6.72	8.64
14	Arkansas Acala 37 (K. & H.)	10,125	12.8	62.5	880	35.9	316	83	34	73.9	18	12.12	7.01	8.59
15	Arkansas Acala 33 (Ark. Sta.)	8,145	16.9	74.1	659	35.4	233	---	33	79.8	11	12.00	6.87	8.63
16	Arkansas Acala 31 (Ark. Sta.)	15,510	36.6	84.7	657	35.9	236	---	31	91.4	38	9.84	7.77	7.69
17	Arkansas Acala 31 (Ark. Sta.)	6,345	14.4	62.2	654	36.8	241	2	32	77.6	47	11.68	6.99	8.50
18	Trice 322 (Ark. Sta.)	8,505	21.1	87.3	767	36.3	278	36	30	94.5	36	10.62	6.99	8.16
19	Arkansas 17 (Ark. Sta.)	6,150	2.6	45.2	1,127	34.8	388	143	36	74.2	46	12.80	6.90	8.47
20	Express 116 (Ark. Sta.)	6,525	16.5	66.6	813	34.8	283	35	36	80.4	43	12.35	6.90	8.66
21	Express 116 (Ark. Sta.)	10,575	37.1	86.6	681	36.8	251	---	31	95.3	37	9.38	8.87	8.05
22	Express 121 (Miss. Sta.)	10,695	4.5	63.2	1,497	36.7	549	301	35	70.2	51	12.47	7.36	8.74
23	L. Express 7 (Coker)	8,475	0	59.4	1,041	34.7	363	117	36	86.8	39	10.49	7.83	8.39
24	L. & P. L. 6	7,365	1.7	62.5	951	38.1	362	121	34	83.4	45	10.13	6.41	8.09

25	Delfos 1341 (Miss. Delta Sta.)	11,085	36.4	82.0	775	35.9	278	41	35	92.6	.39	9.94	5.75	8.25
26-ck	Delfos 2 (Ston. Ped. S. Co.)	16,505	33.0	79.3	653	35.8	234	---	29	93.9	.38	10.12	5.83	7.71
27	Delfos 2 (Ston. Ped. S. Co.)	10,455	27.2	74.4	827	34.5	285	54	35	92.7	.34	8.97	5.16	8.52
28	Delfos 6102-324 (Ston. Ped. S. Co.)	9,615	36.0	77.9	765	33.9	259	31	36	88.2	.38	10.28	5.50	8.44
29	Williamson 10 (Humco)	6,045	0.5	33.2	784	29.9	234	8	37	77.9	.38	13.16	5.79	7.91
30	Super Seven 4 (Coker)	10,335	0.2	49.1	1,208	35.1	424	201	35	77.3	.35	11.45	6.44	8.00
31-ck	---	10,185	39.8	82.0	600	36.7	220	---	31	96.7	.37	3.31	5.66	7.82

¹Numerator of fraction only used.

TABLE 5. VARIETIES TESTED IN 1929 AT THE COTTON BRANCH EXPERIMENT STATION

Order plant- ed and row No.	Variety, strain and source	Plants planted	Earli- ness	Total yield seed cotton	Lint	Lint yield	Lint gain over check	Staple length	Bolls to the pound	Lint from 100 bolls	Weight of 100 seed	Lint index	Seed per lock
		<i>Num- ber</i>	<i>Per cent</i>	<i>P'nds</i> <i>616</i>	<i>Per cent</i> <i>33.7</i>	<i>P'nds</i> <i>220</i>	<i>P'nds</i> -----	<i>32nds</i> <i>30</i>	<i>Num- ber</i> <i>102.5</i>	<i>P'nds</i> <i>.34</i>	<i>Grams</i> <i>8.94</i>		<i>Num- ber</i> <i>7.51</i>
1-ek	Trice 304 (Ark. Sta.) -	8,745	44.1	71.3	33.7	220	-----	30	102.5	.34	8.94	5.13	7.51
2	Dixie Triumph (Wat- son)	8,955	1.5	29.3	36.6	410	191	29	80.7	.44	9.71	5.79	7.99
3	Wilson Type Big Boll -	11,070	9.6	46.0	34.5	312	94	29	90.7	.37	9.56	5.19	7.85
4	Dixie 14 (Humeo)	5,985	0.0	27.9	37.5	303	85	31	81.2	.45	9.24	5.80	8.14
5	Cleveland 54 (Miss. Sta.)	9,285	6.0	45.9	36.2	320	103	32	81.0	.44	10.80	6.39	8.05
6-ek	Miller (Miss. Sta.)	9,165	39.1	69.9	35.8	216	-----	33	102.3	.34	9.17	5.25	7.58
7	D. & P. L. 8	10,050	1.3	35.8	35.4	349	134	33	66.8	.52	12.79	7.11	7.89
8	Arkansas Rowden 40	9,975	17.6	44.0	39.3	309	95	32	86.7	.46	9.30	5.97	8.33
9	(Ark. Sta.)	7,485	4.6	41.0	35.2	296	82	33	67.8	.51	12.04	6.67	8.01
10	Arkansas Rowden 2119	7,815	9.2	46.3	35.9	312	99	32	67.5	.52	11.73	6.72	8.05
11-ek	(Ark. Sta.)	8,685	44.4	73.6	35.9	212	-----	30	101.4	.35	8.60	4.89	7.55
12	Arkansas Rowden 1034	9,570	14.1	43.5	35.8	294	88	33	72.6	.48	11.01	6.28	8.26
13	Arkansas Rowden 1077	9,450	7.9	68.8	35.4	266	66	33	90.5	.39	9.51	5.31	8.03
14	Arkansas Rowden 2088	9,090	4.3	36.9	36.3	327	132	31	68.7	.52	12.41	7.13	8.28
15	(Ark. Sta.)	9,750	8.0	53.6	36.3	281	92	35	89.1	.41	10.29	5.86	7.61
16-ek	D. & P. L. 6	7,950	47.7	73.1	36.0	183	-----	32	104.6	.34	8.31	4.75	7.29
17	Arkansas 17 (Ark. Sta.)	10,080	9.1	40.8	34.1	311	119	36	84.7	.40	10.67	5.60	7.96
18	Express 121 (Miss. Delta Sta.)	9,465	5.9	42.1	34.8	326	125	36	78.9	.44	10.34	5.63	8.73
19	Misdell 1 (Miss Delta Sta.)	6,750	24.9	45.8	34.4	213	3	36	80.9	.42	11.17	6.33	8.41
20	Deltos 6102 (Ston. Fed. S. Co.)	7,740	33.7	57.4	33.5	297	-----	35	100.7	.33	8.75	4.54	8.36
21-ek	(S. Co.)	8,640	40.6	67.3	35.3	228	12	31	96.7	.36	9.11	5.13	8.06
22	Deltos 2 (Ston. Ped. S. Co.)	8,535	28.1	47.8	32.4	257	31	35	94.1	.35	8.98	4.66	8.30
23	Super Seven 5 (Coker)	7,365	1.4	33.0	35.8	220	97	35	89.9	.40	9.39	5.31	7.63
24	Super Seven (Isgrig)	9,840	1.1	39.4	34.3	323	102	35	92.4	.36	9.27	4.96	7.85
25	Arkansas Acala 37	8,970	15.2	45.1	34.9	299	81	34	79.4	.42	10.48	5.95	8.21
26-ek	(K. & H.)	8,510	44.8	69.2	36.1	216	-----	30	100.8	.35	9.24	5.43	7.78

1 Numerator of fraction only used.

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TABLE 6. VARIETIES TESTED IN 1930 AT THE COTTON BRANCH EXPERIMENT STATION

Order plant- ed and row No.	Variety, strain and source	Plants wilted	Earli- ness	Total yield seed cotton	Lint yield	Lint gain over check	Staple length	Bolls to the pound	Lint from 100 bolls	Weight of 100 seed	Lint index	Seed per lock
		Per cent	Per cent	P'nds 275	Per cent	P'nds 94	32nds ¹	Num- ber	P'nds	Grams		Num- ber
1-ek	Trice 304 (Ark. Sta.) -											
2	Arkansas 17 (Ark. Sta.)	3	89.0	301	33.5	101	33	91.7	35	10.70	5.54	7.87
3	Express 317 (La. Sta.)	2.8	90.9	317	33.6	107	33	103.1	.32	10.83	5.61	7.69
4	Misdel 2 (Miss. Delta Sta.)	10.7	95.7	347	32.9	114	33	119.0	27	8.77	4.97	8.05
5	Delios 668 (La. Sta.) -	17.6	93.2	295	33.2	89	32	100.0	29	9.68	4.95	7.77
6-ek	Super Seven 5 (Coker)	17.7	93.8	272	33.2	92	32	114.9	29	8.83	4.37	7.84
7	D. & P. L. 6	5.9	90.8	311	35.3	111	30	95.2	38	9.94	5.52	7.84
8	Arkansas Rowden 2119	5.4	94.3	346	35.5	123	33	101.0	33	10.12	5.32	7.87
9	Arkansas Rowden 2119 (Ark. Sta.)	5.0	94.5	246	34.7	85	28	74.6	.45	12.64	6.79	8.11
10	Dixie Triumph (Wat- son)	2.4	93.9	223	33.8	75	29	97.1	33	9.68	5.12	7.85
11-ek		16.7	94.0	250	33.5	84	28	112.4	.28	9.16	4.71	7.73
12	Half & Half (Sum- merour)	19.3	94.4	268	44.8	120	24	89.3	.47	8.63	7.35	8.44
13	Arkansas Rowden 40	3.4	96.3	291	33.8	98	28	75.2	.44	12.67	6.54	8.03
14	Wilson Type Big Boll	4.8	93.6	305	33.3	102	5	95.2	.33	10.48	5.54	7.82
15	D. & P. L. 10	6.9	95.5	338	36.0	122	21	100.0	.36	9.70	5.27	7.69
16-ek		14.3	98.0	302	34.7	105	29	113.6	.29	8.91	4.92	7.82
17	Cleveland 54 (Miss. Sta.)	6.7	94.3	348	34.3	119	13	91.7	.36	10.64	5.72	7.90
18	Arkansas Rowden 2088			362	34.9	126	19	70.9	.48	12.28	6.60	8.33
19	Wilt Cleveland 28-5	4.3	95.4				29					
20	(Coker)	3.0	95.1	339	34.5	117	32	97.1	.35	10.64	5.58	8.08
21-ek	Arkansas Acala 34											
22	(Ark. Sta.)	11.865	7.2	310	34.6	107	2	87.0	.39	11.30	6.05	7.90
23	Arkansas Rowden 3053	18.340	14.8	331	33.2	110	29	107.5	.30	9.65	4.85	7.84
24	(Ark. Sta.)	11.445	4.9	345	36.2	125	14	73.0	.47	12.34	7.21	8.08
25	Miller (Miss. Sta.)	16.590	5.1	370	35.3	131	20	73.5	.46	12.87	7.54	7.97
26-ek	Arkansas Rowden 4053	10.500	3.0	253	35.4	90	28	73.5	.47	12.83	7.02	8.11
	(Ark. Sta.)	7.680	5.2	252	32.7	85	29	68.5	.48	13.18	6.81	7.89
		20.370	17.2	334	33.7	113	28	105.3	.31	9.35	4.86	7.77

¹Numerator of fraction only used.

